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OF

OPHTHALMOLOGY

SEPTEMBER, 1950

COMMUNICATIONS

SIXTEENTH INTERNATIONAL CONGRESS OF OPHTHALMOLOGY

"LADIES first" sums up the truth about the 16th International Congress of Ophthalmology. Congresses exclusively male are as desolate as Hamlet without the Ghost. Valiantly as the misogynists may struggle to make a success of it, most of the stranded males moon about in anticipation of their journey homeward. It may therefore be placed on record that the wives and daughters of our Congress visitors were welcome not only for their own charming selves, but also because they made the men more radiant, more truly congress-minded.

Nobody alive could fairly apportion the credit due to those ladies who planned for the Congress. Paid staff and voluntary helpers alike, they set to work with a loyalty never to be forgotten. In the days immediately before the Congress, their tasks mounted to a pressure-peak which persisted until the closing ceremony. Some worked far into the night, and the missing of meals became almost habitual to them. Separate mention of all who forwarded the social schemes might well be embarrassing and invidious, but one exception to this rule must surely be admitted, and that is Lady Duke-Elder.

It would be interesting to speculate how many miles the

President of the Congress and his wife covered within this eventful week, but still more interesting is the observed fact that they never appeared to be in a hurry, nor did they ever cease to convey their sense of joy at the presence of friends informally circulating. Further reference will presently be made to Sir Stewart Duke-Elder's performance of his presidential duties, but he himself would be the first to proclaim how much his path was made smooth by the devoted help of Phyllis. One characteristic manifestation of Lady Duke-Elder's personality was her readiness to praise and encourage all those who were playing a part in Congress business. Such tokens of gratitude made people feel that it was a privilege to help. Thus Lady Duke-Elder directly benefited the Congress by her own exertions, as well as working indirectly, through the enthusiasm with which she animated others.

Bowman Memorial Service

On Sunday, July 16, the day before the Congress was declared open, the Venerable C. E. Lambert, Archdeacon of Hampstead, officiated at a special service held in St. James's Church, Piccadilly, London, to commemorate Sir William Bowman, F.R.S., founder of the Ophthalmological Society of the United Kingdom. After the service in this bomb-shattered building, Professor J. W. Nordenson of Stockholm, President of the International Council of Ophthalmology, proceeded to the Baptistry, where he laid a wreath at the Bowman memorial tablet. During the service, which was attended by members of the Bowman family, Professor Nordenson paid tribute to the nobility and versatile genius of that great man, particularly stressing his operative skill, and his ability as a teacher. Professor Nordenson also reminded the congregation about a significant meeting between Bowman, Donders, and von Graefe here in London during the year 1851, six years before the First International Congress of Ophthalmology.

Sir Stewart Duke-Elder expressed deep gratitude for Professor Nordenson's gesture of sympathetic understanding, and drew attention to the fact that Bowman was no less remarkable for kindliness and warmth of personality than he was renowned as a clinician, a scientist and a teacher. It was strangely moving, said Sir Stewart, to be standing there in the ruined church where Bowman used to worship a hundred years ago.

Pre-Congress Week

For the benefit of the many members and associates who were able to reach England before the Congress, a number of clinical and pathological demonstrations, interspersed with sight-seeing,

had been arranged at various teaching centres in Great Britain from July 10 to 15. Dr. G. I. Scott had contrived a most ambitious programme at his own University and in Glasgow. The visitors also had the chance to gaze at some of the loveliest scenery in Scotland, and to witness the admission of Dr. H. Arruga (Barcelona), Sir Stewart Duke-Elder and Dr. Alan C. Woods (Baltimore) to the fellowship of the Royal College of Surgeons, Edinburgh.

The North of England tour, which included a visit to York Minster, was in the hands of Mr. W. M. Muirhead, Mr. G. W. Black and Mr. J. Foster. Mr. P. Jameson Evans and Mr. R. D. Weeden Butler were responsible for the Midland tour, and the Southern one was organized by Mr. N. Cridland and Mr. E. C. Zorab. There was also a South-Western tour under the control of Mr. A. G. Palin. Some of the British ophthalmologists who would have participated in these activities were prevented by other engagements, such as examinership in the Diploma of Ophthalmology, or duties in connection with the Annual Meeting of the British Medical Association held at Liverpool. Nevertheless these tours formed a happy introduction to the International Congress.

On July 15 the President and Council of the Royal College of Surgeons entertained the members of the International Council of Ophthalmology to dinner in the Council room at Lincoln's Inn Fields. After Sir Cecil Wakeley, P.R.C.S., had delivered a cordial speech of welcome, replies were made by Professor J. W. Nordenson, President of the International Council, and by Sir Stewart Duke-Elder, President of the Sixteenth International Congress of Ophthalmology. On the evening of the following day, a larger invasion of the College premises took place, because the President and Council kindly sanctioned their use for a cocktail party given by several British ophthalmologists, whose guests were able to circulate in the entrance hall, and mount to the Library and Council Room, where many for the first time in their lives filed past the portraits of John Hunter, Lister, Cheselden, and other giants of old.

Opening Ceremony

In the assembly hall of Friends House, Euston Road, London, on the morning of July 17, Sir Stewart Duke-Elder formally requested H.R.H. the Duke of Gloucester to open the Sixteenth International Congress of Ophthalmology, and to welcome the delegates and friends throughout the world in the name of the Royal Patrons of the Congress, their Majesties the King and

Queen. His Royal Highness began by reading the following message from H.M. the King:

> *To the President and members of the XVI International Council of Ophthalmology: As Patrons of the Congress, the Queen and I are glad to welcome to London the delegates who have come from all parts of the world to attend it.*
>
> *We wish every success to your meeting and trust that, as a result of your deliberations, great advances will be made in relief of blindness and in the alleviation of human suffering.*
>
> **George R.**

The Duke of Gloucester went on to express his pleasure at opening such an assembly, where people could meet to pool their experience and engage in mutual discussion of their problems and difficulties. He recalled that the First International Congress was held at Brussels in 1857, and that none had been held in London since 1872. His Royal Highness then wished success not only for the scientific deliberations of the Congress but also for those moments of relaxation when members would have the chance to get to know each other. Finally he extended a cordial welcome to the delegates, members, and associates coming from over sixty different countries.

On behalf of the International Federation of Ophthalmological Societies and of its Council, Professor J. W. Nordenson, President of the International Council, expressed profound gratitude to their Majesties the King and Queen for having graciously consented to be Patrons of the Congress. He also offered respectful thanks to H.R.H. the Duke of Gloucester for having lent distinction to the ceremony of opening. Professor Nordenson went on to announce that the distinguished services to ophthalmology of Dr. H. Arruga (Barcelona) had been judged by the Council to merit the Gonin Medal, instituted by the University of Lausanne and the Swiss Ophthalmological Society in memory of Jules Gonin as a reward for valuable scientific contributions. Dr. Arruga, whose home government elevated him to the rank of Count during the Congress week, then received the medal from the hands of His Royal Highness.

Sir Stewart Duke-Elder, President of the Congress, also declared his deep appreciation of their Majesties' gracious message of welcome, and thanked H.R.H. the Duke of Gloucester for conveying their message, and for coming in person to inaugurate the meeting. After referring to His Royal Highness' constant interest in medicine and in humanitarian aims, Sir Stewart went on to read the following loyal message in reply to that of their Majesties the King and Queen:

" The British members of the XVI International Congress of Ophthalmology beg to offer their loyal and devoted greetings to your Majesties; and all the members of this Congress, representing 64 nations, unite in sending their thanks to your Majesties for your gracious message of welcome. Your patronage of this Congress and your personal interest in our proceedings are indications of those feelings which you share with us for the fullest co-operation among all the nations of the world for a furtherance of knowledge and the relief of human suffering."

Sir Stewart then proceeded to deliver his Presidential address.

Presidential Speech.—" I think it would be of interest if at this opening ceremony we paused for a quarter of an hour to consider where our science of ophthalmology stands in this year which marks the mid-point of the 20th century. I do so because this year constitutes a landmark in the history of our specialty: in a sense a bicentenary, and in a very real sense a centenary. For it can be said that modern ophthalmic surgery is now two centuries old and dates from the achievement of that great Frenchman, Jacob Daviel, occulist to Louis XV, who introduced his operation for cataract in 1747 and communicated his method to the Academy in Paris in 1752. But if modern ophthalmic surgery is approximately 200 years old, this year marks the centenary of ophthalmology as an independent specialty within the larger kingdom of Medicine owing to the genius of a still greater German; for on December 6, 1850, Herman von Helmholtz first demonstrated his ophthalmoscope to the Physical Society of Berlin.

" It is true that three years previously, in 1847, Charles Babbage, an English mathematician—one of whose other claims to fame is that he invented the first calculating machine—invented a similar and indeed more efficient instrument. But since Babbage allowed his ophthalmoscope to lie in his desk for seven years, to Helmholtz must go the honour and the glory of revealing to the world the mysteries of the inner eye, of making ophthalmology an exact science, and of laying the foundation stone of that great structure of knowledge, to improve and add to which is our privilege and our joy, and the purpose of this assembly.

" It is not, of course, true to say that the discovery of the ophthalmoscope by Helmholtz itself revolutionized ophthalmology. We must look upon his achievement in its proper setting; for the decade centred in 1850 was without doubt the most productive and the most exciting in the whole history of

medicine. This was perhaps a reflection of the unrest of the spirit of man which marked a crucial stage in the long political duel between dynasts and democracy throughout Europe. In 1848 the French revolution, dammed back for sixty years by the brilliance and imperialism of Napoleon, burst out again, and from the barricades of Paris sparks flew all over the continent, kindling fires in Italy, Austria, Germany, and beyond, releasing smouldering forces hitherto clamped down, and incidentally directing a stream of immigration to America, fertilizing it with much of the best of its human and spiritual riches.

"About that time, too, amidst this fermentation of social and political ideas, a material revolution was going on apace. Steam railways, introduced in 1825, were now beginning to trace themselves all over the face of Europe. In 1851 the first underwater cable was laid between England and France to introduce the age of electricity. In 1856 the Bessemer process for the making of steel put a new gigantic material framework for human affairs into the hands of man. Within these few years' time, distance and power were transformed, and a stride was made in the material conditions of life greater than in the hundreds of years between the Roman empire and the birth of Napoleon.

" Round about that time, think what events were shaping in medicine. Charles Darwin, writing his ' Origin of Species,' was revolutionizing the whole of biology. Claude Bernard, in Paris, and Carl Ludwig, in Vienna, were laying the foundations of modern experimental physiology. Virchow, in Germany, was similarly building up the great edifice of cellular pathology wherein he showed that the cell was the ultimate unit for the study of pathological process. In London physicians like Bright and Addison were correlating, with the inspiration of genius, the clinical and pathological aspects of disease. In France, Pasteur, in his studies on fermentation, was founding the new science of bacteriology. In Scotland Lister, writing his essay ' On the Nature of Inflammation', was giving birth to the idea of asepsis which was to transform the face of surgery and thereby save more lives than have been lost in battle since there were records of war, a transformation in no small measure aided by the introduction of anaesthesia—ether by Morton in 1846, in Boston, and chloroform by Simpson in 1847, in Edinburgh. It is interesting that four years after Helmholtz's discovery, Manuel Garcia, the Spanish singer, developed the laryngoscope, setting our sister specialty on a firm foundation.

" And so, in that intellectually tumultuous decade 100 years ago, the whole edifice of mediaeval medicine with its ancient pre-

judices and preconceived superstitions, its reliance on humoral theories for inspiration, and stimulation and depletion for therapeusis—the whole of it went up in flames, and was replaced by a new science built on the solid rock of observation and experiment.

" It is not surprising, therefore, that the new ophthalmology sprang into life with a burst of activity which has never been surpassed. The new world opened by Helmholtz was explored with enthusiastic zeal: it must indeed have been exciting living at a time when within a few years so many things such as no one had even dreamed of were disclosed, when, almost every few months, a new disease was discovered and described. Add to this the work of Bowman and others on the minute anatomy of the eye, of Donders on refraction and the prescribing of spectacles, and a host of others on new techniques in surgery—all within the first decade after the ophthalmoscope was introduced—and we can appreciate that man was provided with a banquet, the richness of which could not be maintained, or if it were, could not be assimilated.

" In the hundred years which have followed, I think it can be said that we have been reaping the fruitful harvest of this prodigal sowing, consolidating and expanding, but adding little that is fundamentally new and revolutionary. But, although within these limits there have been advances aplenty, looked at as a whole, the century has seen an evolution rather than a revolution. Improvements and intricacies of techniques have been added one to the other; von Graefe's iridectomy for glaucoma has evolved into a dozen drainage operations, Daviel's extraction of cataract is to-day transformed; but the significant thing is that we still treat mechanically a symptom in glaucoma, and remove a lens because we do not yet know how to forestall its cellular death. Even corneal grafting, of which we are so proud these modern days, has more than a century-old history, and Henry Power, at the last International Congress of Ophthalmology held in London, in 1872, demonstrated cases of it. The only great revolutionary concept that has been added to the technique of surgery is the treatment of detachment of the retina by Jules Gonin, whose memory we are so proud to honour at this meeting.

" And where are we to-day? We have surely got to the stage when the ophthalmoscope and the microscope have revealed most of their secrets; for revolutionary new advances we require revolutionary new techniques. I think it may be that we are starting a completely new chapter and entering upon another revolution. We do not yet have the background or perspective to say whether

this resurgence of medical thought is related to a more widespread and general stirring of the human spirit among the nations; but it coincides with a time when the material power in the hands of man has seen the prodigious revolution of atomic energy.

" As it was a century ago, the new outlook is based upon a new method of approach. We have seen that Virchow's theory of cellular pathology wherein the cell was taken as a unit, has moulded pathological thought for 100 years. But to-day we can go further: we can leave the world of cells and enter the world of atoms and molecules. From the structural point of view, instead of Virchow's microscope, we are now equipped with the electron-microscope which is opening out a new and more intimate universe within the cell. From the functional point of view we can follow metabolic processes with radio-active elements through all the intricacies of metabolism. The age of biophysics and biochemistry has dawned; and instead of merely describing and mourning over the structural ruins which disease has left behind it, the change in outlook to-day, as I see it, is to probe more deeply, to examine the more subtle nature of the initial defect, to pass from cellular pathology to intra-cellular chemistry.

" The first great revolutionary victory has already been won and the whole of our therapeutics have changed within the last ten years by our new-found ability to overcome a great number of infective organisms—not by their mass slaughter by antiseptics —but by interfering with their intimate metabolism by penicillin and other abiotic drugs. Whither biochemical interference with metabolic processes by such substances as cortisone will lead us, no one can yet tell: but as our knowledge rapidly gets more intimate and our objectives more fundamental, I think it may be true to say that ophthalmology is leaving its first century of adolescence—a formative period where its main activities have been absorbed in the description and classification of gross disease-pictures, and is entering its second century—its adult life—when its goal will be problems of a more fundamental nature, when it can begin to formulate for itself an integrative philosophy based on a knowledge of the first principles of health and disease.

" Whether or not this generation will constitute such a landmark in ophthalmological history as did our predecessors of 100 years ago, is for the future to decide. In the meantime, you may remember what Tscherning said, quoting Guy de Chauliac, when he dared to contradict Helmholtz's theory of accommodation: ' A child can see farther than a giant if he sits upon his shoulders.' Seated securely on the shoulders of those giants of old, 'let us open the windows eastwards and shoot our arrows boldly at the midday

sun : we will not hit our target but at least we will shoot higher than he who aims at a bush upon the ground . For a week in each other's company we shall practice our archery and examine these problems; it will be a great experience, for none of us can complain of their variety or complexity, their difficulty or their interest.

" I hope that you will find much satisfaction in your scientific deliberations; and I hope that you will find much greater satisfaction in the joy of each other's company. For this, to my mind, is the primary function of all international congresses—to meet, to get to know and to be inspired by those from other parts of the world who share a common task and have a common purpose. We will find the week to be short; so let us make the most of it; and whatever else you feel, I would ask you to be sure that I and your British hosts give you a welcome which is heartfelt and warm, and that our only thought is of how we can be of service to you."

In the course of his address, which followed Sir Stewart's speech, Professor Nordenson, as President of the International Council, reiterated his gratitude to the Royal Family, and thanked the British Government for all their help. He also mentioned the hospitality shown by Great Britain in 1872 soon after the Franco-Prussian War. Professor Nordenson then paid generous tribute to Roger Bacon, Isaac Newton, and other British pioneers in optics. Having praised the work of Locke, Berkeley, Porterfield, Young, Cheselden, Bowman, George Critchett, Dalrymple, Mackenzie, Hutchinson, Hughlings Jackson, Priestley Smith, Nettleship, Cummings, and Travers, he pointed out that excellent work was still being achieved in Britain. Finally he lamented the loss of Paton, von Gross, Terrien, Rossi, and those others who had died since the last International Congress was held at Cairo in 1937.

Inaugural addresses from each country would have unduly protracted the opening ceremony. Therefore six men had been chosen to speak for their respective continents. Europe's mouthpiece was Dr. Edouard Hartmann (France); Dr. John H. Dunnington (U.S.A.) spoke for North America; Professor R. Argañaraz (Argentina) for South America; Colonel Sir Jamshedji Duggan (India) for Asia; Dr. Abdel Fattah el Tobgy (Egypt) for Africa; and Dr. J. Ringland Anderson (Australia) for Australasia.

Scientific Communications

If the average listener finds any discourse inaudible, or if his attention for any other reason strays from the matter in hand, he can to a certain extent console himself by piously resolving to read it up when the transactions get into print. Such consolation

cannot, however, satisfy the curious observer who longs to watch the play of expression upon the features of one whose name has long been known to him in ophthalmic literature. Many people besides your reporter must have found it tantalizing, though inevitable, that three halls were in simultaneous use for most of the scientific sessions, so that only a minority of the papers could possibly be attended.

Ophthalmological films were being shown during the discussion on heredity, and throughout five of the other seven scientific sessions. That mainly explains the poor attendance noted at many a first-class paper. Mr. V. H. Negus, who presided over the International Congress of Otorhinolaryngology held last year in London, found that films proved a fatal counter-attraction to papers, even when the latter were being presented by eminent authorities known to possess an attractive style of delivery. Presumably the Executive Committee, to whom Mr. Negus's warning had been conveyed, felt that the disadvantages of pruning the film programme outweighed the disadvantages of almost empty auditoria for papers. The main argument in favour of the Committee's policy is that films cannot be individually distributed, whereas every member of a congress can dwell upon the scientific communications in the quiet of his library, if he awaits publication.

Abstracts were available at the beginning of the Congress, and the papers themselves will appear in the published Proceedings. Therefore not even a summary of the main items need here be set forth. Experts from all over the world could be heard speaking about retinal detachment, corneal grafting, aqueous veins, the rôle of the aqueous humour, squint, radiotherapy, cataract extraction, glaucoma, retrolental fibroplasia, electroretinography, lacrimal disorder and a number of other absorbing topics. It was delightful to listen to the discourses of old friends, such as Prof. H. J. M. Weve (Utrecht), Prof. Marc Amsler (Zürich), Prof. A. Franceschetti (Geneva), Dr. A. J. Bedell (Albany, U.S.A.), Prof. G. Bietti (Pavia) and Dr. Gunnar von Bahr (Uppsala). Others, such as Prof. L. Maggiore (Genoa), Prof. A. Feigenbaum (Israel), Prof. M. E. Alvaro (Brazil), Dr. A. B. Reese (Philadelphia) and Prof. H. Goldmann (Berne), had seldom or never been heard in London before, though their reputations had long been familiar to most of the participants in the Congress. Many other names could easily be added to these, which are taken at random from the list of contributors to the scientific sessions.

The first of the two major discussion subjects was " The rôle of the sympathetic nervous system in the genesis of vascular hypertension and its effect upon the eye ". Opening papers

were delivered by Prof. F. H. Adler of Philadelphia, Dr. S. Schiff-Wertheimer (Paris) and Mr. Hedley Atkins (London). Among those who subsequently took part were Dr. A. J. Bedell and Dr. I. S. Tassman (U.S.A.) and Dr. P. Bailliart (Paris).

" The clinical and social aspects of heredity in ophthalmology " was the second main theme for discussion, opened by Prof. Laurence H. Snyder (U.S.A.), Miss Ida Mann (London and Perth, Western Australia) and Prof. A. Franceschetti (Geneva), the last of whom acknowledged the collaboration of D. Klein, S. Forni, and J. Babel.

Demonstrations, Exhibitions and Films

Operative sessions were held at several of the general teaching hospitals, and at the Moorfields and Westminster branches of the Moorfields, Westminster and Central Eye Hospital. Special physiological and pathological demonstrations were staged at the Institute of Ophthalmology in Judd Street, where every day the departments of pathology, physiology, chemistry, and medical illustration were open to view. Dr. M. Lederman gave demonstrations in ocular radiotherapy at the Wellcome Research Institution, physiotherapeutic methods were displayed by Mr. P. D. Trevor-Roper at Moorfields, and Mr. Harold Ridley held several sessions at St. Thomas's Hospital to show how colour television can be applied to ophthalmological work, including ophthalmoscopy. Orthoptic methods were explained at the Moorfields and Westminster branches of the Moorfields, Westminster and Central Eye Hospital.

The manufacture and fitting of artificial eyes and of contact lenses formed part of the Exhibition of Social and Industrial Ophthalmology in the London School of Hygiene and Tropical Medicine. This interesting display also included methods of preventing eye damage, optical devices for close work, information about miners' nystagmus, and first aid for industrial injuries. One item of paramount importance was an exposition of up-to-date methods for vocational training and recreation among blind people. Astonishing progress has been made during the last two or three decades, so that many blinded persons are now able to play their part in the national economy.

Two other exhibitions were housed in the London School of Hygiene and Tropical Medicine. One of these comprised excellent histological slides. The Illuminating Engineering Society was responsible for the other, in which a number of lighting methods were set out with special reference to the features making for efficiency in various types of work.

Weeks of whole-time study might well have been devoted to

the splendid array of clinico-pathological material at the Wellcome Research Institution next to Friends' House. It was almost heart-breaking to contemplate the rapid dispersal of so much instructive material assembled with such care and judgment. Special congratulations are due to the organizers and exhibitors of this collection, which also included historical books, portraits, early spectacles, and old-fashioned instruments for investigating and operating upon the human eye.

More than sixty films, which had to be spread over six sessions, were shown in the auditorium of the Wellcome Research Institution. Corneal grafting, cataract surgery, and various operations devised for the relief of glaucoma, were shown upon the screen. Here also were some fascinating results of transplantation experiments by Prof. L. S. Stone (Yale University) and his son Dr. W. Stone. Several films dealt with the operative treatment of detached retina, and Mr. H. B. Stallard's three films included one showing his modification of Krönlein's lateral orbitotomy. Certainly the film display proved to be one of the most popular features of the Congress.

On the afternoon of July 17, His Worship the Mayor of St. Pancras (Councillor Sidney G. Williams, J.P.) formally opened the Trade Exhibition at St. Pancras Town Hall. Exhibitors from France, Italy, Switzerland, and the U.S.A. displayed their goods side-by-side with well-known British firms. The ophthalmological and surgical instruments, books and medicaments had been attractively planned by the organizers. Interpreters speaking English, French, Spanish, Italian, and German were available every day.

Ancillary Societies

At a meeting of the Executive Committee of the International Association for the Prevention of Blindness, held on July 18 under the presidency of Dr. P. Bailliart (Paris), the Association's prize was awarded jointly to Dr. Jean-Gallois and Dr. R. Weekers. On the following day a scientific session was held, at which several delegates presented their reports on "Nomenclature and classification of the Causes of Blindness". A discussion ensued.

The scientific session of the International Organization against Trachoma on July 19 began with a presidential address by Mr. A. F. MacCallan, after which several other members delivered papers.

Official Receptions

On July 19, during an evening reception given by the Royal College of Surgeons, Sir Cecil Wakeley, P.R.C.S., conferred

honorary fellowships upon Dr. Paul Bailliart (Paris) and Dr. Derrick T. Vail (Chicago). This closely guarded distinction has only once before been bestowed upon an ophthalmologist. Therefore the fact that two of our number should now be received into the select band is matter for gratitude and rejoicing. Dr. Bailliart was introduced by Mr. F. W. Law, the Secretary-General of the Congress, who stressed the recipient's meritorious research into the retinal circulation, and praised his lucidity of speech. The President of the Congress, Sir Stewart Duke-Elder, dwelt upon Dr. Vail's outstanding work as Editor-in-Chief of the *American Journal of Ophthalmology*, as Professor in the Northwestern University, and as Ophthalmologist-in-Chief to the American forces in Europe during the recent world war.

The President of the Royal College of Surgeons and Lady Wakeley not only welcomed visitors at the evening reception, but also attended the Congress banquet on the following day. Sir Cecil also came to the opening ceremony on July 17, two days after he and his Council had entertained the International Council to dinner. These are some of the many actions whereby he has proved how keenly he desires to help ophthalmology.

Other guests were generously received at the British Medical Association and at the Royal Society of Medicine on July 19. During the earlier part of that same evening a number of senior and official delegates, together with their wives, dined in Apothecaries Hall at the invitation of the officers of the Ophthalmological Society of the United Kingdom, the Ophthalmic Section of the Royal Society of Medicine, and the Faculty of Ophthalmologists. Before the company rose from this dinner, Mr. M. H. Whiting, President of the Ophthalmological Society, presented the Nettleship Medal to Dr. A. J. Ballantyne (Glasgow).

Social Events

On July 18 the Right Honourable Aneurin Bevan, M.P., Minister of Health, on behalf of His Majesty's Government, received members and associates of the Congress at the Tate Gallery, where they had ample room to talk with friends amidst artistic masterpieces. Preliminary circulation of the visitors had already been encouraged by the Congress Reception and Dance on July 17, when they were received by the President and Lady Duke-Elder in the spacious ballroom of Grosvenor House. Here also assembled nearly a thousand diners at tables ablaze with flowers, for the Congress banquet on July 20, when Mr. A. F. Gibbs, the banqueting manager of Grosvenor House, showed what an expert can do with the aid of skilled staff.

The chief guests at this successful Banquet were His Excellency Lewis W. Douglas, the American Ambassador, and Mrs. Douglas. Sir Stewart Duke-Elder, having extended his presidential welcome to friends and delegates, pointed out that the First International Congress of Ophthalmology, held in Brussels in 1857, preceded all other international assemblies convened by branches of medicine and surgery. He went on to emphasize the lack of racial and economic barriers in ophthalmological circles, and reminded his listeners that, whereas only 112 delegates attended the Fourth International Congress, held in London in 1872 under the presidency of Donders, the present Congress embraced over 2,000 people drawn from 66 nations. Sir Stewart then called upon H.E. The American Ambassador to propose the toast of Ophthalmology, not only because the latter might be said to know a great deal about the subject, but also because he was such a warm-hearted friend.

Mr. Douglas, whose speech will be fully reported in the Proceedings of the Congress, expressed his deep appreciation of the services rendered to him by Sir Stewart Duke-Elder, Mr. M. H. Whiting, and Mr. E. C. Zorab, after the severe injury sustained by him last year. He also maintained that the handicap resulting from this injury was not so great as some which other people had managed to surmount. Then he went on to deal with the political significance of events occurring in the Far East. Replies to the toast of Ophthalmology were made by Dr. P. Bailliart, F.R.C.S. (Eng.), a former Gonin medallist, and by Count H. Arruga, F.R.C.S. (Edin.), the latest winner of that medal. To hear Bailliart speaking beautiful French with his resonant voice is always a delight, and Arruga radiates goodwill and civilization, whether or not his listeners can understand the language of Spain.

Social Organization and Expeditions

The Congress registration office was housed in the Old Library in B.M.A. House, so that the familiar courtyard in Tavistock Square was almost constantly thronged with visitors from all over the world. A bureau for the spread of information, the delivery of messages, the distribution of tickets for social events, and a host of other purposes, some of which had not been anticipated, was set up in the Hastings Hall adjoining the old Library.

Advance planning for the entertainment of Congress visitors had been designed to satisfy diverse interests. There were general sightseeing tours of London on four successive days, visits to the House of Lords and the House of Commons, and two trips to Messrs. J. Lyons' Catering Factory at Cadby Hall. Hampton

Court, Westminster Abbey, the Royal Botanic Gardens at Kew, Hatfield House, the Zoological Society of London, Windsor Castle and Eton College, the Royal Naval College and the National Maritime Museum, Greenwich, as well as the Port of London, were visited by various parties. An afternoon reception was given by the London County Council at County Hall. Non-medical films were shown on the morning of July 18, and a dress show by Lachasse took place on July 17. The Hon. Mrs. Williamson-Noble's afternoon at-home on July 21 was accompanied by another Lachasse dress show, and the Martin String Quartet played during Mrs. F. A. Juler's musical at-home on the same evening.

Post-congress expeditions to Canterbury, Cambridge, Oxford, and Stratford-on-Avon were also arranged. At Canterbury the Dean had undertaken to meet the visitors before Evensong on July 22, and Mr. and Mrs. W. E. Heath had invited the returning expedition to tea at their home in Maidstone. Sightseeing tours of the Cambridge colleges were made before early Evensong on July 22. Afterwards the Provost and Fellows of King's College entertained the visitors to tea in the Fellows' garden. On the same day a garden party was given by the Regius Professor of Medicine at Christ Church, Oxford, and Mr. J. Betjeman delivered a lecture on Oxford Architecture in the Hall of St. John's College. The participants in this Oxford expedition were also given the opportunity of seeing Blenheim Palace and other centres of local interest on Sunday, July 23, and then on July 24 followed sightseeing tours of Oxford and Stratford-on-Avon, culminating in a performance of Henry VIII at the Shakespeare Memorial Theatre. Long before these words appear in print, the Executive Council of the Congress will have officially thanked the organizers and hosts who were concerned with these expeditions. It may here be appropriate, however, to say that the efforts expended on these outings were fruitful. Interest was aroused, historical echoes were awakened, and the lawns of our cathedral cities and seats of learning were the scene of many a friendly encounter.

Some of the members and associates went on to Paris, where the Annual Congress of the Société française d'Ophtalmologie was being held from July 24 to 27. Normally the French Society holds it congress in May, but this year it was felt that numerous visitors from afar would welcome the chance of attending the two functions in successive weeks. As professional people leave Paris in large numbers during the last week of July, strong arguments existed in favour of holding the French congress one week *before* the International assembly. On second thoughts, however, the

officers of the French Society realized that some people might be afraid of an anticlimax if a congress so international in character as that of their Society were to precede the International Congress proper, and they therefore sacrificed their own immediate convenience. Let us hope that so civil a gesture by France will not be overlooked, since Latin courtesy is more precious than ever in the fiercely competitive world of to-day.

Closing Ceremony

Professor Nordenson announced that the delegates had agreed to postpone for a year the decision where to hold the next international congress. It was then decided that questions relating to the internationalization of astigmatic axis nomenclature, visual standards for traffic, etc., should henceforth be left in the hands of the delegation instead of being debated in plenary session. Gratitude was then expressed by Professor Nordenson to the British ophthalmologists and their ladies for the success of the Congress, and for the warmth of the welcome extended to visitors from abroad.

Closing speeches were delivered by another group of representatives from the six continents of the world. Prof. L. Guglianetti (Italy) spoke for Europe; Dr. G. Stuart Ramsey (Canada) for North America; Prof. M. E. Alvaro (Brazil) for South America; Dr. N. F. Ayberk (Turkey) for Asia; Dr. R. C. J. Meyer (Transvaal) for Africa; and Dr. W. J. Hope-Robertson (New Zealand) for Australasia.

Sir Stewart Duke-Elder, who now succeeds Professor Nordenson as President of the International Council of Ophthalmology, emphasized the value of friendships formed and strengthened at these international congresses, which he aptly likened to milestones in the progress of knowledge. He went on to thank the International Council for the compliment which it had paid Great Britain in entrusting the management of this Congress to her. Among the members of that Council Sir Stewart particularly thanked Prof. Nordenson, the immediate Past-President, and Prof. H. Ehlers (Copenhagen), whose position as Honorary Secretary of the Council now passes to Dr. E. Hartmann (Paris). Sir Stewart then expressed his gratitude to all those who had contributed to the scientific discussions, and to the numerous helpers, including lady volunteers, who had for months been engaged upon Congress plans. The industry of Mr. Law, the Secretary-General, was specially mentioned by Sir Stewart, who finally thanked the guests for imparting such success to the gathering, and assured them that they would always be

welcome to return, in order that the happiness of Congress week might be renewed.

The President of the Congress

To close this account without praising the way in which Sir Stewart Duke-Elder discharged his presidential duties would be impossible. He and Lady Duke-Elder seemed to be everywhere at once, renewing old friendships and forming new ties. At the microphone after the Grosvenor House banquet he created the impression of speaking directly, and with simple sincerity, to every separate person in the room. There are many different recipes for making an effective speech, but few speakers can benefit from them, because devices successfully adopted by one person may fall flat when another borrows them. Sir Stewart's oratorical charm depends upon his individual approach to each member of the audience. Egotism he wisely eschews, because he is aware that few things are more embarrassing than the speaker who talks mainly of himself, whether in a vein of glorification or in one of pretended belittlement.

Of the visitors who had never previously met our President, many must have been surprised to find him so innocent of pomp, when they thought of the massive published work standing to his credit. Loaded with academic trophies by the ophthalmologists of Great Britain and elsewhere, he has now attained such eminence that some of his future marks of distinction may be destined to exalt rather the donor than the recipient. His activities in war and peace have extended for many thousands of miles in various directions, and always he has borne a load of responsibility in the care of the great. The fertility of his imagination can only be described by Dominie Sampson's favourite superlative PRO-DI-GI-OUS because spare notions for other people's research have kept welling out of him, even while he has been breathlessly following his own scientific trails. As though these commitments were not enough, he finds time to sit on innumerable Boards, and nobody answers a letter with greater promptitude.

Sir Stewart's friends have long ceased to marvel at his energy. They know that he is a law unto himself, although he would never be guilty of rating himself above the " lesser breeds without the Law ". He has held the burden of the presidency with all the greater distinction because of his lightness of touch. In raising the prestige of British ophthalmology, Sir Stewart has added to his own stature, which already stood high before this sixteenth milestone came into being.

Epilogue

From this quiet room, where a clock ticking upon the mantelpiece is the only competitor with silence, trees and flowers and grass are the only real objects visible through the window, and yet the lawn seems to be populated with imaginary visitors lingering in the precincts of Tavistock Square. Foremost among the company is a modest man unembellished by trappings, but wearing the true stamp of dignity. It is the immediate Past President of the International Council of Ophthalmology, Professor Nordenson of Stockholm, a resourceful linguist, blessed with friends in all the countries represented at this memorable assembly. Let us salute him by changing two words of Shakespeare's immortal tribute:

"This is the noblest Viking of them all."

COMPARATIVE PROVOCATIVE TESTS IN GLAUCOMA*†

BY

WOLFGANG LEYDHECKER

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IT is the purpose of this paper to compare the results of the lability test of Bloomfield and Lambert (1945) with those of its two components, the venous-congestion test of Schoenberg (1929) (referred to as the "cuff test") and the cold-pressure test of Kahler and Sallmann (1929) (referred to as the "ice test"), on a number of normal and glaucomatous eyes, in conditions which correspond as closely as possible. Further, the reaction is investigated of the same group of glaucomatous eyes to the water-drinking test of Marx (1925-28) and Schmidt (1928-31), the mechanism of which has been described in detail in a separate communication (Leydhecker, 1950). The results will be correlated to the spontaneous phasic variations of the ocular tension. These have been shown by Thomassen (1946) and Thomassen and Leydhecker (1950) to influence a number of provocative tests, all of which have in common the fact that they react on the vascular system of the eye.

Methods

Treatment with miotics was discontinued at least 12 hours before each test. The ocular tension was measured in all cases by the author with the same Schiötz X-tonometer, the patient lying supine with the head slightly elevated. One drop of pantocaine 1 per cent. was used for local anaesthesia. In most cases one reading only was taken each time, the patient's head being in a horizontal position, the eye looking vertically upwards towards the patient's suspended finger, and the tonometer being applied vertically on the middle of the cornea.

For the "cuff test" a sphygmomanometer-cuff was put round the patient's neck so that the cushion lay equally on both jugular veins. It was inflated to a pressure of 40-45 mm. Hg for one minute, the time being measured by a stop-watch. A higher pressure was regarded as too uncomfortable, especially in elderly patients. For the "ice test" one hand was immersed up to the wrist in a bowl of iced water for one minute. In the "lability test" both procedures were combined.

For an adequate comparison between the three tests it is desirable to compare groups of each type of test performed when the eye was in the same phase of its diurnal variation of pressure. This purpose was achieved by an assessment of the spontaneous phasic variations of the ocular tension as each test was performed or by applying all three tests at an interval of a few minutes. The latter procedure was adopted on 109 occasions in the series of glaucomatous eyes studied. In all cases tonometry was performed 30 minutes before the test and again at the end of the test, while the hand was still in the water or the cuff

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still inflated, or both. The tension returned to its previous level in approximately 3 to 5 minutes. Since in some cases it fell slightly below, or rose slightly above the values obtained before the test, tonometry was repeated before each new test. Thirty minutes after the last test the tension was taken again.

The order in which the 109 comparative tests were performed was: 1st the lability test, 2nd the cuff test, 3rd the ice test; immediately thereafter the patient massaged with a towel the hand chilled during the lability test.

Controls showed that a reversed order did not alter the results, if the intervals between the tests were sufficiently long (3-5 minutes) to allow the tension to return to approximately its previous level. Owing to the lightness of the instrument there was no fall in the ocular tension due to a massage effect of the repeated tonometry. Cuff tests repeated at intervals of a few minutes gave the same results, showing not only that the tension returns to the original level, but also that the conditions in the eye are not significantly altered by repeated venous congestion.

The water-drinking test was done on a separate day. The patients drank 500 or 1,000 ml. water before breakfast, and the tension was measured 30 minutes before, immediately before and 15, 25, 35, and 45 minutes after the ingestion of water. Miotics were discontinued 24 hours previously.

Results

Normal Eyes.—The lability test was done on 79 eyes and resulted in rises of 6 mm. Hg or less in eight cases, and of 7 or 8 mm. Hg in three cases. Since rises of 9 mm. Hg have been described in normal eyes (Bloomfield and Lambert, 1945; Sugar, 1948) only rises in tension greater than this are taken as abnormal in this paper.

The cuff test was done on 76 eyes and resulted in rises of 6 mm. Hg or less in 71 eyes, and rises of 7 mm. Hg in two eyes. This is the limit of variation described by Bloomfield and Lambert, and accordingly rises of 8 mm. Hg or more are taken as abnormal.

The ice test was performed on 72 eyes and resulted in rises of 2-4 mm. Hg in only twelve cases. This again is the same limit as that described by Bloomfield and Lambert, and accordingly a rise of more than 4 mm. Hg is regarded as pathological. In nine eyes the tension fell 2 mm. Hg during the test.

The reaction of the blood pressure to the immersion of the hand in ice water was measured in some patients, and rises in the systolic pressure of 0-20 mm. Hg were observed. There was, however, no conclusive correlation between the reaction of the ocular tension and the changes of the blood pressure. The ocular tension fell in some patients by 3 mm. Hg and rose in the same eyes by 6 mm. Hg on another day.

In 76 eyes lability and cuff tests were performed on the same eye after an interval of a few minutes. In fourteen eyes the lability test resulted in a rise 3 mm. Hg or more higher than that obtained with the cuff test; in five eyes the reverse occurred, and in 57 no marked difference was measured. It is interesting that the rise brought about by the lability test was not the sum of the results of the cuff test and the ice test.

Glaucomatous Eyes.—Only eyes suffering from primary glaucoma which had not been operated on are discussed in this paper. The series comprised 52 eyes, 21 of the chronic simple type, 31 of the congestive type. On these, 117 lability tests, 201 cuff tests, and 91 ice tests were performed, and in all of them an assessment of the spontaneous variation of the tension was attempted. The results are given in Table I. The lability test and the ice test showed approximately the same percentage of positive results (9 to 12·7 per cent.)* in the simple glaucoma group as in the congestive glaucoma group. The cuff test produced the largest number of positive results in the congestive glaucoma group (18 per cent.).

TABLE I

Results of the Lability, Cuff, and Ice Tests.

Type of Test	Type of Glaucoma	Patients	Eyes	Tests		
				Total	Positive	Negative
Lability ...	Simple	12	18	46	5	41
	Congestive	17	31	71	9	62
Cuff ...	Simple	12	21	68	6	62
	Congestive	17	31	133	24	109
Ice... ...	Simple	12	19	31	3	28
	Congestive	17	31	60	6	54

In Table II the incidence of positive or negative tests is related to the spontaneous variations of the ocular tension, the phases of which are referred to as "rising", "falling", "level", and "unknown".

A "rising" phase was assumed to exist if tonometry showed a higher tension immediately before the test than it had been 30 minutes previously, and if 30 minutes after the test a higher tension was again recorded. If the tension was rising so slowly that the difference between the first and the last reading (*i.e.*, the rise in one hour) was 7 mm. Hg or less, the test was not recorded as being performed during a rise, since in such cases the result of the test was found not to be influenced thereby.

*It will be noticed that reference is made to the number of positive or negative *tests*, not to percentage of *eyes* which have a positive reaction.

TABLE II

Results of the Lability, Cuff, and Ice Tests in relation to the Spontaneous Variations of the Ocular Tension.

Tests		Type of Glaucoma	Number of Tests done in each Phase of Spontaneous Variation of Ocular Tension*			
Type	No.		Rising	Falling	Level	Unknown
Lability ...	45	Simple	1 (1+)	3 (3—)	29 (2+) (27—)	12 (2+) (10—)
	71	Congestive	5 (4+) (1—)	5 (5—)	36 (1+) (35—)	25 (4+) (21—)
Cuff ...	68	Simple	0	1 (1—)	45 (4+) (41—)	22 (2+) (20—)
	133	Congestive	4 (4+)	8 (8—)	67 (8+) (59—)	54 (12+) (42—)
Ice ...	31	Simple	1 (1+)	0	21 (2+) (19—)	9 (1+) (8—)
	60	Congestive	4 (4—)	0	36 (4+) (32—)	20 (2+) (18—)

* Number of positive or negative tests in brackets (+) or (—)

Similarly a " falling " phase was recorded when the reading immediately before the test was lower than it had been 30 minutes previously, and when the reading 30 minutes after the test was again lower, the total fall of the tension in one hour being 8 mm. Hg or more.

The tension was regarded as " level " if the variations recorded within one hour were less than 3 mm. Hg.

Finally, the type of variation of the tension was recorded as " unknown " if :

(*a*) the change within one hour was more than 3 but less than 8 mm. Hg,

(*b*) the tension at the first and second readings was the same, but at the third higher or lower than before,

(*c*) the difference between the first and second readings indicated a rise or fall of tension, which then remained level when measured 30 minutes after the test,

(*d*) tonometry immediately before the test showed a higher or a lower tension than had been found half an hour before or after the test.

To summarize: a spontaneous rise or fall in tension was recorded only when it increased or decreased continuously through a range of 8 mm. Hg or more during the hour in which the test was done. The incidence of this type of spontaneous variation in tension is small (see Table II); most of the changes in tension occurred more quickly and irregularly, so that an assessment of how the tension changed at the actual time of the test was difficult or impossible. Spontaneous falls or rises in tension complying with the definition given here were observed in approximately 8 per cent. of all tests. All the lability tests (with one exception, which will be discussed later) and all the cuff tests carried out during a spontaneous rise of tension gave a positive result, and those carried out during a spontaneous fall gave a negative result. The incidence of positive tests amongst those done in a level phase was only 2·8 to 11·9 per cent. The ice test, in contrast to the two other tests, was always negative during a spontaneous rise.

TABLE III

*Relative Increases of the Ocular Tension produced by the Lability and Cuff Tests performed consecutively or simultaneously on the Same Eye.**

Order of Tests	Type of Glaucoma		Normal Eyes
	Simple	Congestive	
Lability > Cuff ...	13	22	14
Lability = Cuff ...	27	35	57
Lability < Cuff ...	2	10	5

* Only differences of 3 mm. Hg or more are evaluated.

A comparison of the relative increases of tension obtained with the lability and cuff tests by successive tests after a short interval is given in Table III. For both types of glaucoma the difference was smaller than 3 mm. Hg in more than half the cases. In the remainder, the lability test more frequently produced rises at least 3 mm. Hg higher than those brought about by the cuff test.

In the practical application of both tests, however, these differences are irrelevant, since the occurrence of a positive or negative result is the only thing that matters. In Table IV, therefore, the same tests are compared from this point of view. The comparison shows that in 90·5 per cent. of simple glaucomas,

and in 83·6 per cent. of congestive glaucomas, the same clinical results were obtained with either test, both being positive or both negative when done on the same glaucomatous eye after one another.

TABLE IV

Evaluation of the same Tests as in Table III according to the Clinical Result (positive or negative).

Clinical Results	Type of Glaucoma	
	Simple	Congestive
Lability test + ... Cuff test —	3	4
Both tests + or —	38	56
Lability test — ... ... Cuff test + ...	1	7

TABLE V

Comparison between the Clinical Results of the Lability Test and the Water-Drinking Test in the same Group of Eyes.

Clinical Results	Type of Glaucoma	
	Simple	Congestive
Lability test + ... Drinking test —	0	1
Both tests + or —	5	9
Lability test — ... ... Drinking test + ...	10	10

When the results of the water-drinking test are compared with those obtained with the lability test in the same eyes (Table V) it becomes obvious that the former is more reliable. It was positive in twenty eyes, in which repeated lability tests had negative results, and the reverse occurred in one eye only. In fourteen eyes both tests were either positive or negative.

Finally, when all the 116 water-drinking tests of this study are reviewed (Table VI), the high incidence of positive tests (58 per cent. in simple glaucoma, 67 per cent. in congestive glaucoma) contrasts favourably with the poor results of the other tests reported in Table I.

TABLE VI

Incidence of Positive Results with the Water-Drinking Test.

Type of Glaucoma	Number of Tests		
	Total	Positive	Negative
Simple	50	29	21
Congestive	66	44	22

The results of the water-drinking tests were not influenced by a spontaneous rise or fall in the ocular tension preceding the ingestion of water.

The depth of the chamber angle did not influence the result of any of the tests.

Discussion

The first significant result is that both lability and cuff tests were positive in 8·8 to 18 per cent. of all applications to glaucomatous eyes not under the influence of miotics. These figures do not compare directly with those reported by other observers, since it has been the custom to perform one test of each type on each eye and to evaluate the percentage of eyes reacting positively. In contrast to this method it is the aim of the present paper to study the conditions in which positive or negative results are obtained in repeated applications of the same test to the same eyes. When so many tests of each type are done on a single eye, a considerable percentage of them gives a positive result at some time, so that a report of this kind may appear misleading; but when Tables I and VI are compared, it will be seen that valuable results have been obtained by this method of evaluation. The poor results of the lability, cuff, and ice tests may partially be explained by the lower pressure used for the compression of the jugular veins (45 mm. Hg) as compared with the technique of Bloomfield and Kellermann (1947), Sykowski (1948), and Stine (1948). On the other hand, they are confirmed by Sugar (1948) who obtained positive lability tests in less than half his glaucomatous patients,

though he employed a pressure of 55 mm. Hg. It is felt that Kronfeld (1949) is right when he states that the clinical application of the lability test is discouraging. The ice test was as unreliable as the two other tests.

The water-drinking test, on the other hand, showed an incidence of 58 per cent. positive tests in simple glaucoma (as compared with 10·9 per cent. with the lability test, 8·8 per cent. with the cuff test, and 9 per cent. with the ice test), and 67 per cent. in congestive glaucoma (lability test, 12·7 per cent.; cuff test, 18 per cent.; ice test, 10 per cent.). The better results of the water-drinking test are also obvious when the numbers of positively reacting eyes on which numerous water-drinking and lability tests were performed are compared. In twenty of these the former test was positive and the latter negative, whereas the reverse was observed in one eye only.

A discussion of the mechanism of these tests is unnecessary here since this has been dealt with in previous communications (the lability test by Thomassen and Leydhecker, 1950; the water-drinking test by Leydhecker, 1950); it may suffice to repeat that the water-drinking test acts by changing the osmotic equilibrium between the blood serum and the intra-ocular fluids in contrast to the other three tests which influence the vascular system of the eye. This fundamental difference in mechanism explains why the water-drinking test is uninfluenced by changes in the intra-ocular vascular state as are the lability and cuff tests.

In a previous communication (Thomassen and Leydhecker, 1950) it was pointed out that the lability test is usually positive in a rising and negative in a falling phase of the ocular tension, and that it can be either positive or negative when the tension is level. An analysis of the tests described in the present paper shows that this also applies to the cuff test, while the ice test seems to follow the reverse rule, if any. Only one negative lability test was observed in a rising phase of the tension; and when the same patient was seen again the test was positive during a spontaneous rise. In the first instance the tension was high before the test, so that an error of reading of half a point on the scale of the tonometer may have caused the exceptional result.

The ice test was always negative when performed during a spontaneous rise of tension. It seems likely, therefore, that the regular influence of spontaneous variations in the ocular tension on the result of the lability test is due exclusively to the influence of venous congestion. The combination of the production of venous congestion with the ice test introduces, from this point of view, a disturbing factor which may have caused the negative lability test during a spontaneous rise of tension described above.

It would seem that the combination of the cuff test with the ice test in the lability test offers no clinical advantages as compared with the cuff test by itself (Table IV). Indeed, it would seem a fair conclusion that for clinical purposes all these three tests are of only limited value, and that the cuff test by itself is certainly as good as the lability test and may, in fact, be better since the immersion of the hand into ice water introduces other factors the nature of which is little understood. In any event the practical clinical value of the phasic relations of the tests is small. A positive test means that the ocular tension is abnormally unstable regardless of the phase, while a negative test in a falling or level phase is without significance in the elucidation of the diagnosis of glaucoma. Phasic variations in the ocular tension smaller than 7 mm. Hg in an hour do not affect the outcome of the test, and greater variations themselves demonstrate the instability of the tension without any further test.

Some observations incidental to the main theme of this paper may be of interest.

In some cases of congestive glaucoma gross and rapid variations of the ocular tension have been observed to occur; in some patients the rise of tension almost invariably began after 9 a.m., rose to 60-80 mm. Hg, and showed a spontaneous fall subsiding about 1 p.m. These great variations are not always recognized, for when a diurnal variation curve is plotted with the usual two or three readings (morning, noon, and evening), variations much smaller than those which actually occur may be recorded. These spontaneous rises of tension were frequently not associated with any subjective sensations. It would therefore seem wise that the tension should be measured hourly in hospitalized patients throughout the morning when the presence of glaucoma or an unstable post-operative tension is suspected. In the author's opinion continuous treatment with miotics is unsafe if these gross variations in tension are found 12 hours after the cessation of miotics, as happened in some of the patients in this series. Moreover, patients should also be advised to discontinue miotic treatment for at least this interval before they attend hospital for a routine check-up.

It has also been observed that miotics did not often become effective until 40 minutes after their instillation, during which interval a spontaneous rise of tension continued. Operations should therefore be timed to avoid the hours in which spontaneous rises have previously been observed, since the usual pre-operative preparation with miotics may not control the tension soon enough.

Lastly, spontaneous variations in tension should be taken into account in all procedures expected to change the ocular tension; they may themselves be mistaken for an experimental effect, or may neutralize, or even reverse, the outcome of any such experiment in glaucomatous eyes.

Summary

(1) In 52 eyes suffering from chronic simple or congestive glaucoma which had not been subjected to operation, 117 lability tests, 201 venous-congestion tests, and 91 cold-pressure tests were performed. A positive result was obtained in fourteen lability tests, thirty venous-congestion tests, and nine cold-pressure tests.

(2) The spontaneous phasic changes of the ocular tension at the time of each test were observed: a rising phase was observed

fifteen times, and a falling phase seventeen times, whereas the tension was level in 234 instances, and on 142 occasions the phase could not be assessed.

(3) During spontaneous rising phases of the ocular tension of at least 8 mm. Hg per hour, all venous-congestion tests were positive. During spontaneous falling phases they were all negative. With one exception, the lability test followed the same rules. The cold-pressure test was always negative in a rising phase. It is suggested therefore that the influence of the spontaneous variations of tension on the lability test is due to one of its components only, viz., the venous congestion.

(4) The lability test offers no clinical advantages over the venous-congestion test and its results are complicated by its two different components. As long as the mechanism of both tests is yet insufficiently understood it seems advisable to study the venous-congestion test separately.

(5) In the same eyes, 116 water-drinking tests were performed. Positive results were obtained in 58 per cent. in simple glaucoma, and in 67 per cent. in congestive glaucoma. This test is therefore more reliable than the lability test.

(6) The significance of spontaneous phasic variations of the ocular tension in the diagnosis and treatment of glaucoma is discussed. It is suggested that the spontaneous phasic variations of the ocular tension should be taken into account in all experiments on glaucomatous eyes in which the ocular tension is expected to be altered.

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THE USE OF SODIUM FLUORESCEIN IN ASSESSING THE RATE OF HEALING IN CORNEAL ULCERS*

BY

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FOR nearly 70 years a solution of sodium fluorescein has been used by ophthalmologists for initial detection of breaks in the continuity of the epithelium of the cornea (Pflüger, 1882; Straub, 1888). In contrast, sodium fluorescein has rarely been used to follow the course of healing in corneal lesions or to determine the time taken for restoration of an epithelial covering over a corneal injury. In view of the need for comparing and assessing the efficacy of an ever increasing number of chemotherapeutic drugs and of antibiotics, a reliable method for following the course of healing of corneal ulcers is urgently required.

Action of Fluorescein

A solution of sodium fluorescein does not readily penetrate the healthy epithelium of the cornea. If allowed to remain in contact with the normal epithelium for a sufficient length of time, however, fluorescein can penetrate to the underlying substantia propria of the cornea (Fromm and Groenouw, 1891). Here the fluorescein, during its passage to the anterior chamber, fluoresces vividly on exposure to ultra-violet light. If the fluorescein solution remains in contact with the healthy epithelium of the cornea for no longer than one minute, practically no penetration takes place and no fluorescence occurs.

When the epithelium is absent, devitalized or thinner than normal, application of a solution of sodium fluorescein for one minute now leads to penetration, and the underlying stroma fluoresces on exposure to ultra-violet light.

As an ulcer heals, the corneal epithelium spreads over the surface of the ulcer and increases in thickness. Simultaneously the intensity of fluorescence, after application of fluorescein solution under standard conditions, decreases until it finally ceases.

This end-point is, however, obviously dependent on the various arbitrary features of the test. Moreover, the end-point, disappearance of fluorescence, is no guarantee that the reparative processes are all complete. Indeed, Campbell, Ferguson, and Garry (1950) showed in guinea-pigs that, after injury to the cornea, weakness of the stroma persisted for several weeks after cessation of fluorescence.

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Nevertheless, if a standard technique in the use of sodium fluorescein is rigidly adhered to, it should be possible to gauge with some accuracy the course of healing of corneal lesions. The end-point where fluorescence ceases makes it possible to evaluate, statistically if necesary, the efficacy of various remedial measures.

To follow the regression in intensity of fluorescence and consequently the course of healing, it is necessary to establish standards of reference which can be used to estimate the progress in healing at each examination.

Preparation of Standards

The preparation of suitable standards of reference required an investigation into the relationship of the concentration of sodium fluorescein to its intensity of fluorescence.

We impregnated strips of Whatman No. 1 filter paper with known quantities of sodium fluorescein (B.D.H.). The sodium fluorescein was dissolved in 50 per cent. alcohol, and a known volume of this solution evenly distributed on a piece of filter-paper of known area. This strength of alcohol was found to dry more rapidly than a watery solution and to allow more even distribution of the stain. Higher concentrations of alcohol were found to be unsuitable because sodium fluorescein was incompletely dissolved. The rapid drying necessary for even distribution was ensured by holding the paper in a stream of hot air from a hair dryer.

We prepared a number of strips with concentrations of sodium fluorescein ranging from 0·125 to 128 microg./sq. cm. of filter paper. These strips were exposed to ultra-violet light from a G.E.C. mercury vapour ultra-violet dark bulb lamp. The intensity of the fluorescence was then measured photometrically with a low resistance galvanometer and a barrier-layer photoelectric cell. To absorb ultra-violet light the photocell was screened with a green Wratten filter (61 M). The impregnated strip of filter paper was placed in direct contact with this filter. The relative intensities of the light emitted from the fluorescein-

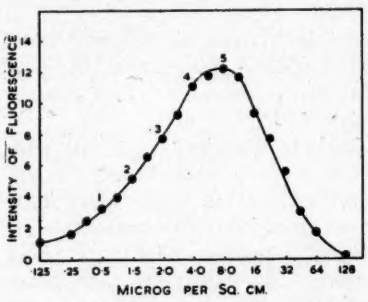

FIG. 1.—Relation of intensity of fluorescence (galvanometer readings) to concentration of fluorescein in microg./sq. cm. of filter paper (logarithmic scale). The points 1 to 5 on the graph correspond to the concentrations chosen for clinical use.

impregnated paper was then read directly on the galvanometer scale. This photometer gave a direct linear relationship between the fluorescent light intensity and the galvanometer reading.

Fig. 1 shows graphically the results obtained. For convenience a logarithmic scale was used on the abscissa. The graph shows clearly that the intensity of the fluorescence rises to a maximum with increasing concentration of fluorescein up to 8 microg./sq. cm. Beyond this point, increase of concentration of fluorescein not only fails to increase the fluorescent response on exposure to ultra-violet light, but actually diminishes it. This phenomenon, well known to physicists, is called " quenching "; the explanation is obscure (Pringsheim, 1949).

From inspection it may be seen that concentrations of fluorescein ranging from 0·5 to 8 microg./sq. cm. give a spread of intensity most useful in the preparation of standards for clinical use. Over this range a geometric increase in the concentration of fluorescein gives an almost linear increase in intensity of fluorescence. Moreover, the hue of the fluorescent light emitted is very similar to that from corneal lesions. Greater concentrations are not suitable for clinical standards because the deep orange colour of the concentrated fluorescein interferes with the hue of the fluorescence.

TABLE

Relation of the Concentration of Sodium Fluorescein to the Intensity of Fluorescence from the Standard Strips of Filter Paper for Clinical Use.

Intensity of Fluorescence	Concentration of fluorescein in microg./sq. cm. of filter paper
0	No fluorescein
1	0.5
2	1
3	2
4	4
5	8

For clinical use, five standard filter paper strips were chosen with concentrations in the range of 0·5 to 8 microg. sodium fluorescein/sq. cm. From the graph it can be seen that the intensities of fluorescence emitted from these strips bear, for all practical purposes, a linear relationship to each other. For simplicity we chose to represent these intensities by the numerals 1, 2, 3, 4, and 5 (see Table). These numerals are approximately proportional to the absolute intensity of fluorescence. Since this absolute intensity depends also on such factors as the distance and strength of the light source, standardization of working conditions is essential.

For convenience we mounted the five strips behind glass under a black paper mask which exposed an area of 1 x 0·5 in. of each strip. There has been only slight fading over a period of nine months.

Use of Impregnated Strips to assess the Course of Healing

The clinical use of a method such as this must be carefully standardized. One drop of a 2 per cent. aqueous solution of sodium fluorescein is instilled into the conjunctival sac. After exactly one minute the eye is washed with enough isotonic saline to remove excess fluorescein solution. The set of standard strips is then held beside the patient's eye.

Comparison is made under illumination by a G.E.C. ultra-violet lamp placed at a convenient distance, say two feet. The intensity of fluorescence from the lesion is then matched against the strips.

Ideally the matching should be carried out in darkness, but is also satisfactory if the surrounding illumination is constant and of moderate intensity.

Using a similar method, Campbell and others (1950) were able to follow the course of healing in deep corneal burns in guinea-pigs, and to show that there was marked delay in scorbutic animals.

The method was equally successful in assessing the value of massive doses of ascorbic acid in the treatment of corneal ulceration in human beings (Boyd and Campbell, 1950). Fig. 2 (also reproduced in that paper) indicates that this method of observation has demonstrated a marked difference in the rates of healing of patients who had and had not received ascorbic acid. It has also given a clear indication of the effect of the ascorbic acid as early as the second day of treatment.

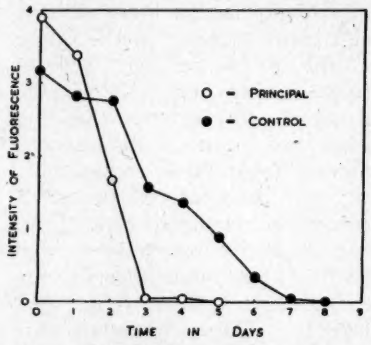

FIG. 2.—Mean intensity of fluorescence of corneal ulcers treated with (principals) and without (controls) ascorbic acid plotted for each day during healing. The figures on the ordinate correspond to the strip intensities described in the text.

Furthermore, the method sharply detected the precise time of cessation of fluorescence in each ulcer. This procedure facilitates statistical comparison of two or more groups of patients undergoing different forms of therapy.

We wish to thank Doctors J. Pendleton White, J. Hill, A. Wright Thomson and A. Mellick of the Glasgow Eye Infirmary, for permission and facilities to examine their patients, upon whom the method outlined in this paper was used.

We also wish to express our gratitude to Professor R. C. Garry and to Dr. J. B. de V. Weir for their kindly criticism and encouragement.

We are indebted to the Rankin Medical Research Fund of the University of Glasgow for defraying the cost of this investigation.

Summary

A clinical method is described for assessing the rate of healing of corneal ulcerations and injuries. The end-point of epithelization can be accurately determined.

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THE ELECTRORETINOGRAM IN GLAUCOMATOUS EYES*†

BY

G. LEYDHECKER

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SINCE Du Bois-Reymond (1849) recorded the first action potential from an eye much work has been done on the subject. The most comprehensive treatment is that of Granit (1947), but the first clinical investigations were made by Karpe (1945). The reaction of the normal human dark-adapted eye when recorded by Karpe's technique is a single positive wave, corresponding to the *b*-wave (Granit), which here represents the reaction of the rods only. The height of a normal record varies between 0·21 and 0·48 mV (Karpe), and depends, among other things, on the amount of light reaching the retina. Karpe also described the reaction of human eyes in various diseases and discussed four electroretinogram records from glaucomatous eyes, three with normal and one with subnormal *b*-waves. It is well known that in glaucoma the peripheral vision (that is, essentially, the rod vision) is often defective and it therefore seemed advisable to determine whether the electroretinogram (ERG) of the dark-adapted eye is influenced by defects in the visual field.

Method

Altogether 107 ERGs were obtained from 73 glaucomatous eyes in 34 patients. Fourteen eyes suffered from chronic simple and twenty from chronic congestive glaucoma. Five eyes were blind; in nine other cases vision had been so reduced that the patients were only able to perceive light or hand movements or to count fingers. The action potential was recorded with the apparatus and technique described by Karpe (1948), the earliest investigations being done under his direction. In most cases the stimulus was a light flash of 20 lux and $\frac{1}{25}$ sec. The patients were dark-adapted for 5 minutes before the stimulus was given. In most cases the size of the pupil of the dark-adapted eye was measured before the record was taken. A run of about ten recordings (one every quarter minute) was made. At the beginning and end of the run the apparatus was calibrated to 0·5 mV. For the evaluation of the curves the mean of all *b*-waves was taken. Because most of the patients were under treatment with pilocarpine or eserine drops it was found that in some cases the pupil was too small to allow the entrance of sufficient light to produce a maximal *b*-wave. In these cases the stimulus was increased to 80 lux. The ocular tension was measured before every experiment, and the visual acuity and fields of vision of all the patients were recorded. Patients with cataract were excluded. In almost every case it was possible to obtain records of both eyes at one session. Most of the patients easily learned to suppress blinking and eye movements which produce disturbing artefacts in the ERG. Beyond giving pantocaine drops, it was not necessary to use any kind of anaesthetic or sedative.

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† The expenses of this research were defrayed by the Alexander Pigott Wernher Memorial Trust.

Results

In the ERGs (taken with a stimulus of 20 lux for $\frac{1}{25}$ sec.) from the 73 glaucomatous eyes, the recorded action potential of the retina varied between 0·09 and 0·44 mV.

The relationship between the *visual field* and the action potential is seen in Table I. The eyes are divided into four groups:

(*a*) Normal field;

(*b*) Loss of approximately half or less of the peripheral vision;

(*c*) Loss of more than half the peripheral vision;

(*d*) Blind eyes, including those in which the vision was reduced to counting fingers or hand movements.

TABLE I

Relationship between Height of b-wave and Extent of Visual Field

Visual field	Height of *b*-wave	Eyes		
		No.	%	Total
No field changes	low	7	32	30
	intermediate	8	26	
	normal	15	50	
Loss of half field or less	low	7	37	19
	intermediate	5	27	
	normal	7	37	
Loss of half field or more	low	6	60	10
	intermediate	4	40	
	normal	0	—	
Blind, Perception of Light, Hand Movements, or Counting Fingers	low	6	43	14
	intermediate	3	21	
	normal	5	36	

Eyes classified according to loss of peripheral field. Height of *b*-wave of ERG differentiated for each group thus:

Low (less than 0.23 mV). Intermediate (0.23—0.30 mV). Normal (over 0.30 mV).

Stimulus was light flash of 20 lux and 1/25 sec.

When the records from the eyes with full vision and normal fields are compared with those from blind eyes, it is obvious that the extent of the visual field is of minor importance in determining the height of the *b*-wave. In eyes with a normal field (Group *a*) the percentage of low records (amplitude < 0·23 mV) was 23, whereas in blind eyes (Group *d*) it was no higher than 43. Normal records (> 0·30 mV) were obtained in 50 per cent. of eyes with a normal field, and in 36 per cent. of blind eyes. When the same eyes were stimulated with 80 lux the percentage of normal curves increased in both groups; amongst the blind eyes normal records were obtained in 43 per cent., and low amplitude curves in 21 per cent.

Table II shows the same eyes grouped according to the *diameter of the pupil*. Those with a total iridectomy or a pupillary diameter of 4 mm. or over gave normal *b*-waves in 65 per cent. and low values in 12 per cent. of cases. On the other hand, the reverse relationship was found in eyes with a pupillary diameter of less than 4 mm. (normal *b*-waves—13 per cent., low—56 per cent.). Amongst the eyes with a pupil of 4 mm. or over, eight

TABLE II

Relationship between Height of b-*wave and Pupil-Diameter*

Pupil-Diameter	Height of *b*-wave	Eyes		
		No.	%	Total
4 mm. or more, or large iridectomy	low	4	12	34
	intermediate	8	24	
	normal	22	65	
3-4 mm. or less	low	22	56	39
	intermediate	12	31	
	normal	5	13	

Eyes classified according to pupil diameter. Height of *b*-wave of ERG differentiated thus: Low (less than 0.23 mV). Intermediate (0.23—0.30 mV). Normal (over 0.30 mV). Stimulus was light flash of 20 lux and 1/25 sec.

were blind. In five of these a *b*-wave of > 0·30 mV was obtained with a stimulus of 20 lux, and in six when the stimulus was 80 lux. The remaining three eyes gave an intermediate *b*-wave with 80 lux.

The *ocular tension* varied from 15-80 mm. Hg (Schiötz) in all groups. There was no correlation between it and the magnitude

of the ERG; neither was there any difference between the cases of chronic simple and chronic congestive glaucoma.

Discussion

These results show that field changes in glaucomatous eyes do not significantly influence the height of the *b*-wave in the ERG. Even in blind or almost blind eyes, normal *b*-waves were obtained. The stage of the disease and its type (congestive or simple), the ocular tension, the peripheral and central vision all appear not to influence the ERG. The height of the *b*-wave in eyes with a normal field and large pupils was not significantly greater than in blind eyes with large pupils. It is thus obvious that in glaucoma the same correlation exists between the diameter of the pupil and the height of the *b*-wave as that shown by Karpe for normal eyes. The ERG does not therefore provide a means of determining how much of the visual function remains in glaucoma.

These findings are consistent with our knowledge of the pathological changes which take place in the retina of glaucomatous eyes and with our theories of the origin of the action potential recorded in the ERG. In glaucoma the optic nerve fibres and ganglion cells degenerate while the remaining layers of the retina are little affected (Wolff, 1948). In this connection it is interesting that Karpe has described normal ERG records in cases of descending optic atrophy and has classified the atrophy in glaucoma with it; his findings are confirmed by the present investigation. It would seem to follow that since normal *b*-waves have been recorded in blind eyes with glaucomatous atrophy of the optic fibres, the retinal action potential must originate deeper than the ganglion cells. This view is consistent with that put forward by Bartley (1939), and Granit (1947), that the retinal process responsible for the *b*-wave is located in the bipolar layer.

Summary

ERGs were obtained from 73 dark-adapted glaucomatous eyes. The height of the *b*-wave, which indicates the response of the rods, ranged between 0·09 and 0·44 mV, the average being 0·267 mV for a stimulus of 20 lux (normal value, 0·21 — 0·48 mV). The value was higher when the pupil was large or when the stimulus was increased from 20 to 80 lux. There was *no correlation with visual function and records of normal size were obtained from blind eyes.* These results are consistent with the view that the action potential originates in the bipolar cell layer of the retina and is not therefore impaired in glaucomatous degenera-

tion which affects the fibres of the optic nerve and the ganglion cells.

I am much indebted to Professor G. Karpe, of Stockholm, and Dr. Katharine Tansley, of the Institute of Ophthalmology, for help and guidance in this work.

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OPERATION FOR ENTROPION OF THE UPPER EYELID IN TRACHOMA*

BY

T. TORGERSRUUD

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IN Ethiopia, as in most oriental countries, trachoma is a very common disease, perhaps the most common of all eye diseases. There are no statistics available of its frequency among the population, but statistics from the Ophthalmic Clinic at the Haile Sellassie I Hospital show the following:

Patients attending the Ophthalmic Department (1946-1949): 5,803.

Frequency of trachoma, 2,347 cases (40·4 per cent.: men, 36·8 per cent.; women, 46·8 per cent.).

Entropion palp. sup., 490 cases (20·8 per cent.: men, 17·6 per cent.; women, 25·0 per cent.).

These figures show that about one person out of every five coming to hospital with trachoma has entropion of the upper eyelid. These figures may seem high, but I have the impression that the type of trachoma in Ethiopia is not too severe. Probably the number of grave cases is rather small compared with the very great morbidity. The majority of the trachoma cases—without complications—probably do not seek treatment, but are cured after some time without serious complications.

Therapy

The only possible way to treat entropion of the upper eyelid is by operation, and to tackle this task it was necessary to find a good surgical method. The recognized methods are mainly of two types: the operation from outside after Snellen-Streatfield, Hotz-Anagnostaki, and others, and the operation from inside after Ewing, Blaskowicz, and others. The patho-physiological fact seems to be that it is the conjunctiva and the nearest part of the tarsal plate in which the scarring process is located, which gives the entropion. This is stressed by Blaskowicz, although he is of the opinion that only the conjunctiva is subject to the shrinking process and that the tarsus does not shrink, an opinion which I cannot share as I have often found the whole tarsus enlarged to 5 or 6 times its usual thickness, which also shows that the tarsus is involved in a pathological process. I must admit that there is no correspondence between the thickness of tarsus and the degree

* Received for publication April 24, 1950.

of entropion, as I have found very severe entropion with almost normal thickness of tarsus and *vice versa,* but this is probably only due to the stage in the evolution of the disease at which the operation is performed. It seems to me, therefore, that both the tarsus and the conjunctiva tarsi are involved in the process, and that they combine in giving rise to the entropion.

The technique here employed is a modification of the original Blaskowicz " inversio tarsi ", founded on his patho-physiological ideas about the origin of the process. From lack of access to medical literature in this country I have had no opportunity to find out whether this procedure is new, probably it has been done by others, but it seems worth while to give it a wider notice.

Technique

(1) Pantocain anaesthesia of conjunctival sac. Injection of 2-3 ml. novocain-adrenalin is made under the skin and as deeply as possible into the upper eyelid from the outside. Care must be taken to inject sufficiently far nasally and temporally. If necessary and especially when the operation is performed by an inexperienced person a hornplate is inserted under the eyelid to protect the eyeball.

(2) Three sutures are inserted into and parallel to the margin of the eyelid, one in the middle and the others between the 1st and 2nd, and 3rd and 4th, quarters, respectively of the length of the eyelid. The hornplate is then changed over to the outside, and by means of the three sutures the whole eyelid is everted over the plate and kept in this position by an assistant. (Fig. 1).

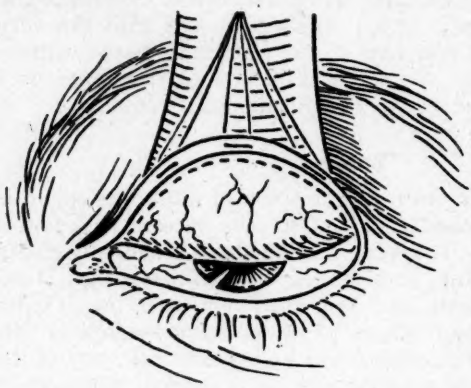

FIG. 1.—Everted position of eyelid.

(3) An incision is then made 2-3 mm. from and parallel to the margin of the lid on the conjunctival side. The incision goes through the conjunctiva and the thickness of whole tarsus. It is important to make the cut surface parallel to the end of the tarsal plate (Fig. 3). The incision is carried well out to the corners of the margin. At the inner end there is usually bleeding from an artery, which it is advisable to stop with a catgut ligature. In performing this incision it is very interesting in many cases to see how thick the tarsus is and how detritus and pus are coming from the incised Gl. Meibomi. It seems that these glands play an important part in maintaining trachoma as they are inaccessible to treatment from outside.

(4) After the incision is made, the outside of the proximal part of the tarsus is very easily dissected free to an extent of 2-3 mm. Then the anterior surface of the distal tarsus fragment has to be dissected away just down to the eye-lashes which may then be seen in the bottom of the wound. This is best performed with a pair of curved eye-scissors and a big-toothed forceps. The eye-lashes must not be damaged. Now the distal tarsus fragment is readily movable and can be turned

90° outwards. If it is still fixed, however, a small incision is made with a pair of scissors as far temporally as possible and under the skin perpendicularly to the margin. Care must be taken not to make this incision too large, and to avoid incising the skin, which would be even worse as it would cause deformation later.

(5) The correct application of the sutures is the most important part of the whole operation. Usually six double-armed sutures must be used; these have to be inserted—two to each place—in the middle, and in the border between the 1st and 2nd and 3rd and 4th quarters of the length of the eyelid. It is advisable to start with the middle sutures. The needle is introduced into the conjunctival side of the proximal tarsus about 1-2 mm. from the incision and then carried out in the middle of the thickness of tarsus (the cut surface). From there it is carried through the former outer surface of the distal part of the tarsus as far down as possible and out among the eye-lashes or as near them as possible in the very margin. The same method is adopted for the other needle of the suture, which has to be placed 2-3 mm. from the side of the other. Before tying these sutures we have to insert another double-armed suture 2 mm. above the first. The needle is inserted perpendicularly through the whole tarsus, then it is passed down in the edge between the former anterior surface of the distal tarsus-part and the skin, and goes through the skin just above the eye-lashes. The same is done with the other needle 2-3 mm. towards the side (Fig. 4).

The object of the first suture is to attach the former anterior surface of the distal part of the tarsus to the cut surface of the proximal part of tarsus, thus turning the distal tarsus fragment 90° outwards; the object of the second suture is to secure the distal part in position and if possible to increase the exersion and also to fix the skin just above the lowest part of the tarsus to the outer edge of the proximal part of the tarsus (Fig. 4). The suture inserted last may be tied before the first one. After this the four other sutures are inserted in the same way as described above.

FIG. 2.—Before operation.

FIG. 3.—Incision.

a—b = correct.
a—c = wrong.

FIG. 4.—Sutures in place.

(6) The patient is given a bandage with vaseline or sulphonamide ointment over both eyes (both eyes can be treated at the same time), the bandage is removed the next day and the patient given coloured glasses to protect the eyes. Because of the conjunctival infection it is not advisable to use a bandage for more than one day. On the 1st or 2nd day after the operation there may be swelling of the eyelids, which disappears without complications. The stitches are taken out on the 5th or 6th day. It is rather difficult to remove the stitches, but this must be carefully done as otherwise infection may ensue. (The only complication I have seen in the post-operative period or later is a few cases of polyp.)

This operation may sound complicated in words, but is in fact readily done. I have even trained some unskilled dressers to do it, because of the enormous number of cases and the shortage of doctors—and they learned it quickly and are doing it well. With practice the operation may be performed in 30-35 minutes.

The results are very encouraging, as far as can be judged. A complete " follow up " of all cases is not possible in this country, but it may be supposed that most if not all of the patients with relapses will come back. Up till now (November, 1949) *386 operations* have been performed, 163 by myself, 90 by my assistant, and 133 by a dresser (each case operated means one eyelid).

My own 163 cases (operated in 1946-48) I divide into the following groups:

(1) 22 cases, which were operated in the beginning in a slightly different way, the tarsal conjunctiva by the original method of Blaskowicz (without inversion of the tarsus) was dissected free 5-6 mm. from the tarsus. They showed good results in twenty operations, which were controlled as follows: after 1 week, ten cases; 1-2 weeks, one case; 2-3 weeks, seven cases; 2 years, two cases.

Two cases (both in the same patient) showed relapse after 11 days, the entropion was reduced.

(2) 141 cases showed good results in 137 cases, and were controlled as follows:

After 1 week	18	After 3-6 months	24
„ 1-2 weeks ...	16	„ 6-9 „	11
„ 2-3 „ ...	10	„ 9-12 „	9
„ 3-4 „ ...	4	„ 14-16 „	6
„ 1-3 months ...	34	„ 16-18 „	5

Four cases failed to give perfect results; the entropion was cured but the trichiasis remained: after 6 months one case had two eyehairs towards the cornea, and after 17 months one case had three eyehairs towards the cornea.

Two cases (both in the same patient) showed a relapse after 6 weeks, but it must be observed that this case had previously been operated by an Abyssinian " doctor " with removal of the greater part of the matrix ciliarum, which made the operation more difficult. Similar cases, however, have been operated with good results.

(3) The other 223 operations have not yet been studied, owing to the short time that has passed since the operation, but the immediate result has been good in all.

Summary

Trachoma is a very common disease in Ethiopia, and in the Ophthalmic Clinic 20 per cent. of cases also show entropion of the upper eyelid.

A method of operating for entropion is described, the results being good. Out of 165 operations, 157 were completely satisfactory, and the remaining six showed a residual trichiasis, the entropion being corrected.

TWO CASES OF ACETIC ACID BURNS OF THE CORNEA*

BY

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GLACIAL acetic acid, though extensively used in manufacturing processes, is not commonly seen as a cause of chemical burns of the eye. Two cases which have been seen recently are thought to be of sufficient interest to warrant description, there being little reference to such injuries in the literature.

In both cases glacial acetic acid was put by mistake into the eye by the patient, instead of drops that were prescribed for treatment of an eye condition. In both cases the chemical was washed out of the eye immediately with tap-water and the reaction has been identical. They are, therefore, considered to give some indication of the course likely to be taken by an injury caused by a concentrated solution of this substance.

Case Reports

Case 1.—A man, aged 47 years, was admitted to hospital March 11, 1949, having mistaken acetic acid for adrenaline drops which had been prescribed for a partially blocked naso-lacrimal duct.

He reported to hospital on the same day as the injury, having immediately washed his eye out with tap-water, followed by an irrigation with sodium bicarbonate at a first-aid station. The report on admission was as follows:

Cornea	Fine honeycomb opacity. There was extensive loss of epithelium and the whole of the corneal surface was staining.
Conjunctiva	Very oedematous, with some irregular staining especially in the lower fornix.

At this stage it was difficult to see the condition of the structures deep to the cornea. The eye did not look very seriously damaged and a favourable prognosis was given. An amniotic membrane graft was inserted into the lower fornix on admission and gutt. atropine 1 per cent. instilled.

March 14, 1949. The eye looked quieter, and although the cornea was still stained extensively the patient was considered fit for discharge and out-patient treatment.

March 16, 1949. The corneal condition had improved and it was now possible to get an indistinct view of the iris, which was intensely inflamed. The patient was re-admitted to hospital.

March 19, 1949. A paracentesis was performed because the tension in the eye was raised.

April 2, 1949. The patient was discharged from hospital still showing considerable corneal staining and a fine honeycomb opacity, through which it was difficult to ascertain the state of the iris. In spite of every endeavour the pupil had remained firmly contracted.

The patient reported at regular intervals to the out-patient department, some-

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times with more corneal staining and sometimes with less, until May 26, 1949, when it was realised that he had a completely anaesthetic cornea. It was, therefore, decided that he would benefit from a tarsorraphy, which was accordingly performed. He has since remained comparatively comfortable, and the corneal staining has become progressively less, but there has been little or no improvement in the corneal opacity or in the corneal anaesthesia.

It is stressed that the original appearance of the eye was not sufficiently serious to suggest that either iritis or corneal anaesthesia was likely to develop.

Case 2.—An old lady, aged 66 years, had an Elliot's trephine performed on the left eye for chronic glaucoma on April 30, 1949. She was discharged on May 11, 1949, with the trephine draining well. On May 13, 1949, she reported to the hospital stating that she had by mistake put glacial acetic acid in her eye instead of the pilocarpine drops that she had been given on leaving hospital. The condition on admission was reported as follows:

Cornea	Hazy and oedematous appearance of the lower ⅓ of the cornea with loss of epithelium and deep staining over this area.
Conjunctiva	Very oedematous, with some staining in the lower fornix.

One per cent. atropine drops were instilled and an amniotic membrane graft was inserted into the lower fornix. Again the eye did not appear seriously damaged and a favourable prognosis was given.

A further amniotic membrane graft was inserted three days later and more atropine instilled. By the time this graft had absorbed it was realized that the patient had a fairly intense iritis, with the formation of posterior synechiae which could only partially be broken down with atropine and mydricaine.

May 26, 1949. Our attention having now been drawn to the anaesthetic cornea in Case 1, we discovered that there was complete corneal anaesthesia over the affected area in this case also, and that the sensation was markedly impaired over the unaffected part. As there was still some corneal sensation a tarsorraphy was not thought to be necessary.

This case progressed more favourably, but nevertheless very slowly, the cornea not being completely healed until June 30, 1949. A permanent opacity remained.

Discussion

Many writers have drawn attention to the fact that acid burns of the eye are less harmful than alkali burns, and there is sufficient experimental work to suggest that this is true. This is only of theoretical value. Chemical burns of the eye are always accidental, and a concentrated acid solution is not necessarily less damaging than a weak alkali.

Valuable information on the effect of acetic acid on the tissues

TABLE

Penetration Rates of Fixatives

Fixative	Mean Distance (mm.)	Time (minutes)
Acetic acid	42	1
Mercuric chloride...	106	15
Absolute alcohol	23	15
Osmium tetroxide	15	15

is available from experience in histological laboratories. Acetic acid is used as a fixative for histological preparations on account of its extremely rapid rate of penetration of the tissues. As shown in the Table (Underhill, 1932), acetic acid penetrates approximately half the distance in one minute that mercuric chloride penetrates in 15 minutes.

Guillery (1910) describes a primary and secondary opacity of the cornea occurring in acid burns of the cornea. He suggests that the cornea clears up soon after the primary opacities have occurred, and may become transparent, so that the full extent of the corneal damage does not become apparent for some days. He suggests that the corneal tissues become fixed in the same way as histological preparations and that the tissue is dead and without reaction, but that this necrotic state does not immediately become apparent.

Two points in these cases are worthy of consideration :

(1) The presence of corneal anaesthesia.
(2) The development of an intense iritis.

The presence of corneal anaesthesia is a sign of prognostic significance. In trivial injuries the cornea is hypersensitive, in moderate injuries sensitivity is diminished, and in severe cases it is absent. This is a valuable indication of the degree of damage immediately after the injury when its true extent cannot readily be estimated. If sensitivity remains permanently absent then it is an indication for protection by a tarsorraphy.

The early recognition of iritis is also of importance. This may be difficult through a cornea that has already been rendered opaque by injury. In such cases its presence should be assumed and early and vigorous treatment instituted. Delay in the treatment of an iritis may well lead to the formation of dense posterior synechiae so that the pupil will not readily dilate with atropine. If an iritis is anticipated and an amniotic membrane graft is indicated, the pupil should be dilated with mydricaine, and 1 per cent. or 2 per cent. atropine ointment placed in the conjunctival sacs before inserting the graft. The graft should be left *in situ* only for 24 hours, after which the eye should be examined with special reference to the state of the iris. If necessary a further graft can then be inserted.

The mechanism by which the iritis is produced does not seem clear. The rapid rate of penetration of the tissues by acetic acid would suggest that this substance may penetrate the cornea and set up irritation of the iris; on the other hand, it may be due to the absorption of necrotic corneal tissue into the anterior chamber. However the iritis is produced, there is no doubt that

some substances produce it more readily than others. Ammonia is well known to set up an iritis with a comparatively slight amount of corneal damage, whereas lime produces more corneal and conjunctival damage with less tendency to an iritis except in very severely damaged eyes.

It is therefore suggested that chemicals should be considered not as acids or alkalis, but rather as those substances which readily set up iritis and those which do not. In the first group, the first essential is the treatment of the iritis, in the second, amniotic membrane can safely be inserted and left for 48 hours without the fear of irretrievable damage occurring to the eye before it is looked at again.

Summary

Two cases of acetic acid burns of the cornea are described. Attention is drawn to the risk of iritis developing in these injuries, and the importance of early treatment of this condition is stressed. The value of the corneal sensitivity as a prognostic sign is indicated.

I wish to thank Professor Sorsby for permission to publish these two cases.

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DAY-BLINDNESS *

BY

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DAY-BLINDNESS is a term generally applied to the syndrome of impaired vision in good illumination, associated with almost normal vision in the dark. The terms hemeranopia and heliophobia are synonymous with day-blindness. As the disease shows characteristics opposite to those of night-blindness, the term nyctalopia, as opposed to hemeralopia, is suitable. On the other hand Bourdier (1939) used nyctalopia to describe the state of retinal hypersensitivity characterized by normal day-light vision and supernormal night vision.

Day-blindness can be divided into three groups:

(1) Associated with central opacities of the cornea and the lens (the dioptric nyctalopia of Axenfeld, 1914). Improvement of vision results from dilatation of the pupil at dusk.

(2) Associated with either toxic amblyopia or macular degeneration.

(3) Congenital day-blindness.

Our case is an example of the third group.

Case History

Mr. N. E., 31 years old, came to the clinic with the complaint of bad day-light vision. From his earliest years he had kept his eyes half-shut in daylight. When he went to school he noticed a visual defect which was not improved with glasses. He was treated with miotics for a period, and 15 years ago he noticed for the first time the difference between his day and night vision. Though he was examined by many physicians and was treated with vitamin A, injections of mercury cyanide, and iontophoresis, the condition failed to improve. His father and mother were first cousins but neither they nor three brothers and the remaining relatives showed evidence of ocular defects. He was slightly pale and swarthy. Apart from a malarial infection in childhood he did not remember having suffered from any disease.

The patient wore dark glasses continuously, had always kept his eyes half-shut, and was obliged to close them further in order clearly to recognize objects. Externally both eyes were normal and there was no nystagmus. Skiascopy disclosed in the right eye a mixed astigmatism of $-0{,}50$ D in the vertical and $+1{,}50$ in the horizontal meridian, and in the left eye a simple hypermetropic astigmatism $+1{,}0$ D in the horizontal meridian. Biomicroscopic examinations of the cornea and lens revealed no abnormality. Both pupils showed miosis and sluggish movements; light and convergence reflexes were present. Ophthalmoscopic examination showed in both eyes slightly pale disks and dark red tigroid retinæ, which were considered to be within normal limits in view of the patient's dark complexion. A few round pigmented dots and one or two atrophic patches were scattered over the peripheral areas of the retina.

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In the right eye in the upper external quadrant near the ora serrata, an old patch of chorioiditis was found. No pathological change could be found in the macular area with the binocular ophthalmoscope.

Ocular tension was 22 mm. Hg (Schiötz) in both eyes. Provocative tests gave negative results. In normal day-light, V.A. was C.F. at one metre, while in reduced light, V.A.R. was 6/60, V.A.L. was 6/36. Experimental miosis with

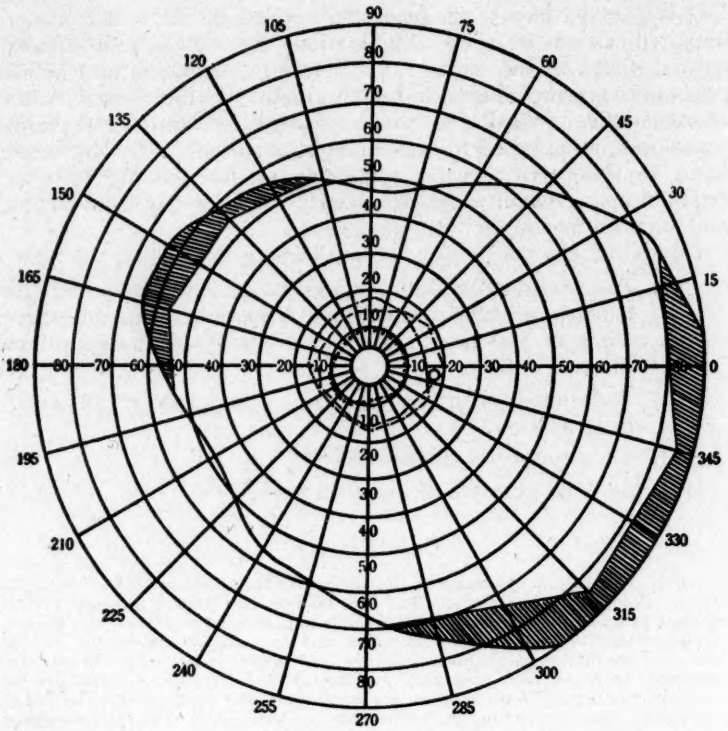

FIG. 1.—Visual field, right eye.

——— 3/330 White — • — 5/330 Blue
. . . . 5/330 Red — — — 5/330 Green

eserine lowered the visual acuity, whereas mydriatics disturbed near vision without improving distant vision.

The light threshold and the dark adaptation tests performed with the Birch-Hirschfeld apparatus revealed nothing pathological. The concentric narrowing of the visual field for white, which was seen in normal day-light examinations, disappeared on reducing the illumination. The colour field examination in normal day-light was impossible, for the coloured test objects of 5 mm. diameter were not seen by the patient. The same examination repeated in reduced light revealed a marked contraction for all colours, especially for red (Figs 1 and 2). As the patient could not distinguish colours properly, the limits of the colour fields were determined by the points at which the patient first perceived slightly coloured

objects, rather than by those at which he recognized them in full colour and saturation.

Holmgren's yarn test gave the following results: The patient recognized the red skein only when he brought it near his eyes. He called yellow, green, and blue, yellow. He matched the red test skein with orange, brown, and yellow; the violet test skein with violet and grey. He also matched the light green test

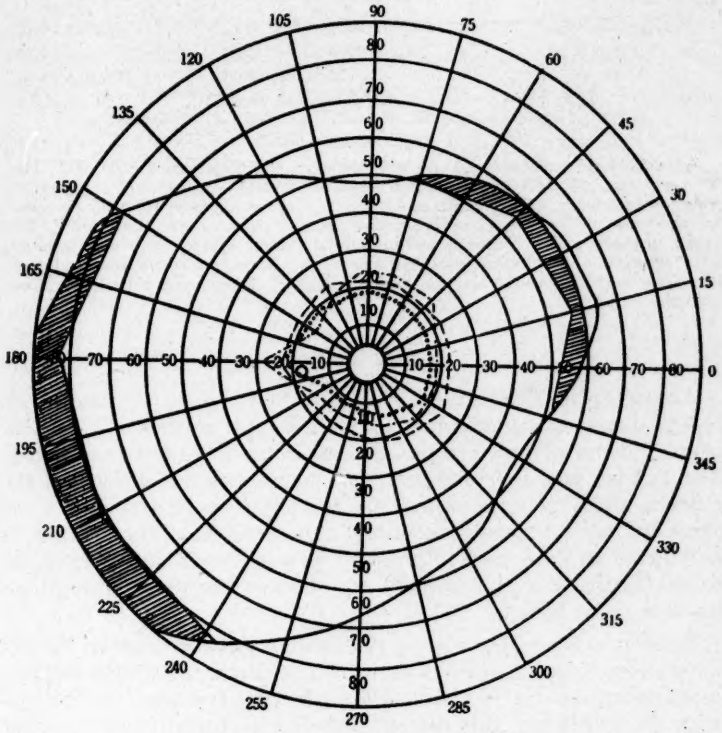

FIG. 2.—Visual field, left eye.

——— 3/330 White — · — 5/330 Blue
. . . . 5/330 Red — — — 5/330 Green

skein with light blue, and the yellow test skein with light blue. Some darker or lighter tones of the test skeins were omitted. Examinations with Stilling's pseudo-isochromatic diagrams (18th edition) revealed that the patient could read the first and second plates very well; from the third to the fifteenth some were recognized with difficulty, some were misinterpreted and others not recognized at all. In Plate XV_1 the number 92 was read as 45; and in Plate XV_2 the numbers 45 and 48 were read as 92 and 67 respectively. Hertel (1929) considered this symptom to be characteristic of yellow/blue blindness (tritanopia).

When he looked through the hand spectroscope in day-light, he saw a colourless spectrum with dark extremities. When the light was gradually reduced, the

patient first distinguished colour at the red end of the spectrum. In the most suitable illumination for the patient the spectrum was composed of the following colours: red, a light colour similar to white, yellow, and green. Their places according to the normal spectrum were as follows:

Red	Or.	Yellow	Green	Blue	Violet

Red	Wh.	Yellow	Green

Arterial blood pressure was 13/8,5 Vaquez; R.B.C. count: 3,200,000, Hb: 60 per cent., W.B.C. count: 3,400; blood picture was: stab: 1 per cent., polymorphnuclear: 57 per cent., eosinophils: 4 per cent, monocytes: 5 per cent., lymphocytes: 33 per cent., sedimentation rate: 3 mm. in the first hour, blood sugar, nitrogen and cholesterin within normal limits; Wassermann and Mantoux tests negative. Radiological examination of the lungs, nasal sinuses, and teeth for a focus of infection, showed no pathological change; the sella turcica was normal.

Discussion

According to Nettleship (1909) day-blindness is associated with colour blindness, amblyopia, and often with nystagmus. There is no evidence of optic atrophy to explain the impairment of vision. The fundus is usually normal, but sometimes the disks and the maculæ show changes, which are too slight to be considered the cause of such a grave functional impairment. The disease is hereditary and recessive; it may be seen in several brothers of the same family, but the parents are always healthy although an uncle may be affected.

Incidence is greater among males than among females, and in most cases consanguinity is found. The disease is congenital and remains stationary. As mental disorders are frequently associated with the syndrome, this disease presents a clinical picture similar to retinitis pigmentosa; and in some cases typical retinal pigmentation has been found. It is, however, a rare disease; including his own and some solitary cases showing no familial incidence, Nettleship (1909) was only able to collect 84 cases in the literature.

Day-blindness is generally supposed to be due to impairment of cone function. Venneman (1906) attributed it to defective nourishment. Goldmann (1936), observing the symptoms of day-blindness in a case which showed temporary occlusion of the central retinal artery, suggested the presence of a lesion in the inner layers of the retina. Thus a disturbance in function of the amacrine and horizontal cells, impairing the contrast function of

the retina, might be the cause. Since histological examinations have not been made in cases of day-blindness, no definite anatomical changes have been described, and some writers suggest that the condition is due to a subtle physiological disturbance.

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THE TREATMENT OF CONGENITAL GLAUCOMA*

BY

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THIS series comprises fourteen cases, in which 25 eyes were operated on. The time over which the eyes were under observation after operation varied from seven years to two months. Three of the cases were reported in a previous communication (McArevey, 1948); their subsequent history is now followed up.

As a cause of blindness in early life, congenital glaucoma has a high incidence. Anderson (1939) reported surveys from several countries, the incidence varying from 2·4 to 13 per cent. of children admitted into schools for the blind. In Eire, in the school of an Institute for the Blind, seven out of 44 were blind from congenital glaucoma, which had by far the highest incidence. An historical review of the treatment of congenital glaucoma would include the various operations for decompressing the eye, the results of which have not been good. The report by Barkan (1942) urged me to try goniotomy. Success in reducing the intra-ocular pressure in my first case gave me further encouragement to proceed in the use of this operation.

Congenital glaucoma, with the subsequent enlargement of the eye in untreated cases, can go on to buphthalmos; this emphasizes the importance of the early detection of the condition in order to prevent damage by the increased intra-ocular pressure. A case treated early, will, by successful lowering of the intra-ocular pressure, give an eye which to all appearances is within normal limits. Congenital glaucoma in early life, however, can easily escape detection until the increased tension has caused great damage to the eye. The earliest symptoms are photophobia and oedema of the cornea; these small children will bury their heads in the pillow, in a manner resembling phlyctenular disease.

Material

This series comprises three types of congenital glaucoma and buphthalmos to which the operation of goniotomy was applied:

(1) Early cases with increased intra-ocular pressure where the eye appeared relatively normal.

(2) Advanced stages of buphthalmos.

(3) Eyes which had already been unsuccessfully operated on by various decompressing operations.

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Of the fourteen cases reviewed, ten were males and four females, bearing out the established fact of the higher incidence of the disease in males. No case reported showed any evidence of naevus of the face or eyelids; all appeared to be true, uncomplicated cases of congenital glaucoma.

Group 1.—Early cases with increased ocular tension giving a favourable prognosis included fourteen eyes. The youngest child operated on in this group was four months old (Case 7). Eleven eyes were treated in infants under nine months old. In this group, with two exceptions, the condition could not have been of long standing.

One child was first seen when 4½ years old; the left eye was in an advanced stage of buphthalmos, the right eye had only recently been noticed to have become enlarged. A second child was brought when two years old; there was definite buphthalmos, but the eye was not much enlarged.

The best results were obtained in this group—the tension of nine eyes was reduced by one goniotomy operation, three by two operations, and one by three operations. One child had had both eyes operated on in 1942 at the age of 9 months; in 1950 the tension was 15 mg. and the vision 6/18 in each eye. A second child had been operated on in 1943; seven years later the vision in the eye was 6/9 and tension 15 to 18 mg.

Group 2.—Six eyes were treated for advanced stages of buphthalmos, the length of time from the onset of the disease varying from one to five years (Case 13). The tension in all cases in this group was 50 or over, and notwithstanding the duration of the disease, some eyes retained useful vision. In one case of over nine years' standing, vision was still 4/60 in one eye, showing how compensation can occur. In this case, goniotomy was not successful in reducing the tension. All these cases had severe haemorrhage at the time of the operation, and this group gives the worst prognosis.

Group 3.—Four eyes were operated on, the two cases having been referred by colleagues. The eyes had previously been trephined and a goniotomy operation performed on each unsuccessfully. The disease in these cases could not have been of long duration, as the children's ages were five months and one year respectively. The tension was reduced, the prognosis comparing favourably with cases in Group 2.

This result supports the view that, after congenital glaucoma has lasted for a long time, Schlemm's canal becomes obliterated, so that the division of the embryonic tissue in the angle of the anterior chamber has no effect.

Technique

The technique was that followed by Barkan. The tension in all cases was taken by Schiötz tonometer, the weight used in all cases being 7·5 g. Ether anaesthesia was employed; it is particularly necessary to have deep anaesthesia while recording tension. A canthotomy was necessary in most cases, particularly in advanced buphthalmos. An assistant fixes the eye at 12 and 6 with scleral forceps and draws the eye forward, thus allowing access to the nasal side of the limbus, making all the angle of the anterior chamber available for stripping.

Complications.—Haemorrhages were more copious in the advanced cases. In one case there was prolapse of iris, which was, however, easily replaced. In two cases the iris was caught by the knife, but without any damage.

Cases

Case 1. Boy aged 9 months. Both eyes marked buphthalmos, photophobia. Mother stated both eyes enlarged since birth.

18.9.42. Tonometry: R.E. 7·5 g., Schiötz, 45, L.E. 7·5 g., Schiötz, 45.

28.7.43. Bilateral goniotomy. Tension R.E. 7·5 g., 15, L.E. 7·5 g., 15. Vision R.E. 4/60, L.E. 4/60.

1949. Corrected R.E. 6/18, L.E. 6/18. Both corneae clear, pupils active, child attending school.

Case 2. Boy aged one year. Left eye advanced buphthalmos. Right eye corneal oedema.

9.6.43. Bilateral goniotomy. Tension R.E. 35, L.E. 50.

23.6.43. Left eye trephine. Tension R.E. 25, L.E. 50.

1949. Vision R.E. 6/9, L.E. 6/60: Tension R.E. 15 to 18, L.E. 20. In this case, goniotomy was not successful in lowering the tension of the left eye. A trephine operation had been performed on the left eye. Pupils active both eyes, residual opacities in the cornea of the left eye.

Case 3. Boy aged 4¼ years (Shields). The right eye had been noticeably large since birth. Within the last year the left eye appeared to be getting larger. Child brought on account of pain. Right eye acute glaucoma, hazy cornea. Left eye, buphthalmos, deep anterior chamber, cornea apppeared clear when examined without anaesthetic.

12.8.47. Tension R.E. 7·5 g., 40, L.E. 7·5 g., 30.

15.8.47. R.E. goniotomy operation not successful.

5.9.47. R.E. trephine.

22.9.47. Tension R.E. 7·5 g., 20.

22.9.47. L.E. goniotomy.

R.E. tension 7·5 g., 20, L.E. tension 7·5 g., 15.

Two years after operations, vision R.E. 6/60, L.E. 6/9. Both pupils active, cornea left eye clear, some opacities right cornea, child attending school.

Case 4. Girl aged 5 months. Admitted 8.12.47, having been born Rotunda Hospital 7.7.47, very under weight at birth, no eye abnormalities noted then. When seen, marked photophobia, both corneae hazy, definite congenital glaucoma.

15.12.47. Tension R.E. 29, L.E. 33.

19.12.47. L.E. goniotomy.

24.12.47. R.E. goniotomy.

2.1.48. Tension R.E. 14, L.E. 29.

9.1.48. L.E. goniotomy.

19.1.48. Tension R.E. and L.E. 23.

9.2.48. R.E. goniotomy.

18.2.48. Tension R.E. 24, L.E. 19 to 20. R.E. goniotomy.

25.2.48. Tension R.E. and L.E. 17.

28.4.48. Tension R.E. 15, L.E. 18.

6.8.48. Tension R.E. 15, L.E. 20.

24.11.48. Tension R.E. and L.E. 9.

28.2.49. Tension R.E. 12, L.E. 9.

5.4.49. Tension R.E. and L.E. 12.

Pupils active, left eye inclined to diverge, right disk cupped, left disk difficult to see, opacities in cornea.

Case 5. Boy aged 7¼ years. Admitted 25.1.48 from St. Mary's Institute for the Blind, Merrion, Dublin, with glaucoma. Tension R.E. and L.E. 50. Old case of buphthalmos with advanced changes, thinning of sclera, scarring of each cornea. Bilateral goniotomy. Both anterior chambers filled with haemorrhage.

7.2.48. Tension R.E. 20, L.E. 18. Vision, count fingers hand movements about 2 metres, each eye.
7.5.48. Tension R.E. 25 to 27, L.E. 14 to 15.
8.5.48. R.E. goniotomy.
15.5.48. Tension R.E. and L.E. 15.

Case 6. Baby girl aged 5 months. (Reference A.M.) Admitted with marked photophobia, enlarged cornea each eye, congenital glaucoma.
20.9.43. Tension R.E. and L.E. 53.
Bilateral trephine failed to reduce tension.
6.12.48. Bilateral goniotomy.
15.12.48. Tension R.E. 20, L.E. 24.
5.1.49. Tension R.E. and L.E. 50.
11.1.49. Bilateral goniotomy, both eyes full of haemorrhages.
4.2.49. Bilateral goniotomy. Tension R.E. and L.E. 50.
16.2.49. Tension R.E. 12, L.E. 12 to 15.
25.3.49. Tension R.E. 15, L.E. 20.
6.5.49. Tension R.E. and L.E. 15. Marked improvement in baby's general health. There is some scarring of each cornea.

Case 7. Boy aged 4 months. Mother said both eyes large since birth, marked photophobia, hazy corneae, child evidently in pain, bilateral congenital glaucoma.
31.7.49. Tension R.E. 40, L.E. 23.
3.8.49. Bilateral goniotomy.
2.9.49. Tension R.E. 35, L.E. 27.
7.9.49. R.E. goniotomy.
14.9.49. Tension R.E. and L.E. 24.
26.10.49. Tension R.E. 18, L.E. 18 to 20. Both corneae clear, no photophobia, under observation.

Case 8. Boy aged 7 months. Admitted 11.7.49, marked photophobia, enlarged and hazy corneae. Tension R.E. 27, L.E. 22.
13.7.49. Bilateral goniotomy, no haemorrhages at operation.
27.7.49. Tension R.E. 12, L.E. 18.

Case 9. Boy aged 6½ months. (Referred G.I.W.) Both corneae enlarged, some haziness of each cornea, some photophobia. Tension R.E. 27 to 30, L.E. 22 to 25.
19.3.49. Bilateral goniotomy.
6.4.49. Tension R.E. 12, L.E. 25.
6.4.49. L.E. goniotomy.
14.4.49. Tension R.E. 12, L.E. 18 to 20.
20.4.49. Discharged, under observation.
11.10.49. Child progressing satisfactorily, no photophobia, tension normal.

Case 10. Boy aged 10 months. (Referred M.C.) Admitted 17.9.48. Mother noticed cloud over both eyes when a month old, enlarged hazy corneae, great photophobia.
18.9.48. Tension R.E. 50, L.E. 53. Bilateral goniotomy was performed prior to trephine operation, but neither equalized tension.
5.10.48. R.E. trephine.
12.10.48. L.E. trephine.
23.10.48. Tension R.E. and L.E. 30.
27.11.48. Tension R.E. 50, L.E. 45.
29.11.48. Bilateral goniotomy.
8.12.48. Tension R.E. 26, L.E. 43.
13.12.48. L.E. goniotomy.
29.12.48. Tension R.E. 20, L.E. 12 to 15.
29.1.49. Tension R.E. and L.E. 12 to 15. Diameter of each cornea 15 mm., right optic disk cupped, left optic disk normal, both corneae clear, no photophobia.

Case 11. Girl aged 6 months. When one month old, it was noticed that the left eye appeared larger than the right. Brought to hospital suffering from acute glaucoma, hazy cornea, deep anterior chamber, congenital glaucoma.

6.12.48. Tension L.E. 7·5 g., 50, R.E. 7·5 g., 25.
L.E. goniotomy.
15.12.48. Tension L.E. 7·5 g., 15, R.E. 7·5 g., 25.
7.1.49. Clear cornea left eye, active pupil, under observation.

Case 12. Boy aged 8¼ years. Came to hospital with acute glaucoma left eye, buphthalmos. Corneal diameter L.E. 15 mm., R.E. 12·5 mm.
27.11.48. Tension R.E. 18, L.E. 50. Vision R.E. 6/9, L.E. 6/36.
27.11.48. L.E. goniotomy.
18.12.48. Tension R.E. 18, L.E. 15.
18.5.49. Tension R.E. 18, L.E. 50.
1.6.49. L.E. goniotomy (contact lens).
7.6.49. L.E. acute glaucoma.
8.6.49. L.E. goniotomy.
20.2.50. Tension R.E. 20, L.E. 22. Vision R.E. 6/9, L.E. 4/60, cornea left eye, clear, 18 degrees myopia, deep cupping optic disk.

Case 13. Girl aged 3 months. Attended hospital first in 1940 with acute glaucoma. Tension R.E. and L.E. 7·5 g., 55.
29.3.40. R.E. cyclodialysis.
2.4.40. L.E. cyclodialysis.
24.6.40. Tension R.E. 60, L.E. 70.
24.6.40. R.E. trephine
25.6.40. L.E. trephine.
1948, aged 8 years (Referred B.S.L.).
26.6.48. Tension R.E. 35, L.E. 48.
4.7.48. R.E. goniotomy. Very severe haemorrhage completely filling anterior chamber.
4.8.48. Tension R.E. 50, L.E. 45.
3.9.48. Vision R.E. and L.E. 1/60.
12.11.48. Tension R.E. and L.E. 40.
3.1.49. R.E. goniotomy, very great haemorrhage filling anterior chamber.
11.2.49. Tension R.E. and L.E. 50.
5.9.49. Tension R.E. 35, L.E. 45.
R.E. goniotomy. Large haemorrhage during operation filling anterior chamber.
3.10.49. Tension R.E. 35, L.E. 40.
L.E. Goniotomy.
15.11.49. Tension R.E. 35, L.E. 30.

Case 14. Boy aged 2 years. R.E. pthisical, with central nebulae, probably the result of ophthalmia neonatorum. (Referred L.W.) L.E. buphthalmos.
16.9.49. Tonometry R.E. 25, L.E. 50.
L.E. goniotomy (10-5) (DD) some hyphaema.
29.9.49. Tonometry R.E. 20, L.E. 22. Both pupils dilated, pilocarpine T.I.D., report one month.
21.10.49. Child's eyes open much better.
7.11.49. L.E., corneal oedema, pupil small. Tonometry L.E. 45 mm. Hg.
12.11.49. Goniotomy 12 to 9. Pilocarpine T.I.D. (Referred D.D.)
23.11.49. Tonometry 32.
30.11.49. Goniotomy 6 to 9.
16.12.49. Tonometry R.E. 22, L.E. 15. To use Eserine ½ per cent. drops, under observation, report one month.

Comment

Goniotomy was successful in lowering the tension in 21 of the 25 eyes reported. In two eyes, on which a goniotomy had first been performed without success, a trephine operation was required as a follow-up to reduce tension.

Tension was reduced in ten eyes with one previous goniotomy

operation, in seven with two goniotomy operations, and in three with three operations. Tension was also reduced in three cases of advanced buphthalmos; severe haemorrhages occurred in all these advanced cases. The tension of two eyes with advanced buphthalmos was not reduced. In four eyes, which had been unsuccessfully trephined, goniotomy reduced the tension.

I found that the tension in the eye did not become stabilized after a goniotomy operation for perhaps three weeks or more, and unless there were definite symptoms of increased intra-ocular pressure, such as pain, photophobia, and cloudiness of the cornea, it was better to defer a second goniotomy, keeping the eye on myotics.

Summary

(1) The tension in 21 of 25 eyes with congenital glaucoma was lowered to within normal range by goniotomy.

(2) Failure occurred in two eyes with advanced buphthalmos.

(3) The operation is easy to perform and it would appear that it should be adopted as a primary operative procedure. If it is unsuccessful, other methods of decompression should be applied.

(4) Barkan's claims are well supported.

Conclusions

Provided cases with congenital glaucoma are seen early enough, goniotomy will reduce the ocular tension. This is borne out by the cases in Group 1 of this series, and by four eyes operated on in Group 2, in which previous unsuccessful decompressing operations did not interfere with the results.

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BARKAN, O. (1942). *Amer. J. Ophthal.*, **25**, 552.

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BOOK NOTICES

Eye Surgery. By H. B. STALLARD, M.B.E.. M.D., F.R.C.S. John Wright and Sons, Ltd., Bristol. Simpkin Marshall. Ltd., London. 2nd ed., 1950. 52s. 6d.

The author has taken advantage of the appearance of the second edition of his well-known book to incorporate much new material in the way of reading matter and illustrations, and the size has been increased by just over 200 pages. One cannot blame him for this because in the four years which have elapsed since the publication of the first edition, ophthalmic surgery has advanced to a far greater extent than those actively engaged in it perhaps realize. New operations and techniques are constantly being described, and are, so to speak, assimilated almost unconsciously by those who practise them, and it is not until they look back over a certain period that it occurs to them how many these are. The new techniques listed in the preface include lamellar grafting, scleral resection for detachment of the retina, the use of circular radium plaques for the intra-ocular neoplasms, stricturotomy of the naso-lacrimal duct, and the use of a keratome and scissors for cataract incisions.

Most ophthalmic surgeons spend much time reading journals and transactions and attending meetings, by which means they keep in touch with advances in operative surgery, General principles are thus acquired, but the details are lacking and if suddenly called upon to perform say a scleral resection for detached retina, difficulties might arise with regard to technique. If "Eye Surgery" is at hand, however, these difficulties will vanish because the descriptions of operations are so clear and concise that no one of reasonable experience and dexterity should have difficulty in performing these after reading the text.

Besides the incorporation of new material many alterations have been made in the general body of the book. The section dealing with reconstructive surgery of the lids, for example, has been expanded by fifty pages and now contains many additional diagrams, and the chapter dealing with the orbit now has several helpful diagrams illustrating the author's modification of Kronlein's operation.

The second edition, particularly of a text-book, is not always an improvement on its predecessor, for additional material may be clumsily inserted or less carefully written; but this is certainly not the case with the volume under review, where, although large portions of the original matter are retained, the old material blends imperceptibly with the new and forms with it a homogeneous account of modern eye surgery.

Worth and Chavasse's Squint. Edited by T. KEITH LYLE. Pp. 319, + viii, 208 illustrations. Baillière, Tindall and Cox, London. 1950. 35*s*.

If a dictator were to decree that someone should be allotted the task of writing a practical book about squint, how would his medical henchmen proceed to obey such an order? They would make a short list of able young men whose fathers had achieved merit in surgery, and out of this group they would pick a man endowed with manual dexterity, enthusiasm, and a capacity for hard work. Mr. Lyle fulfils all these requirements and more besides. His manual dexterity has been augmented by wide operative experience founded on a longer training in general surgery than most ophthalmologists have been able to undergo. Then again, he has ardently pursued neuro-ophthalmology, a subject inseparable from ocular muscle balance. Another formidable claim to consideration is Mr. Lyle's familiarity with traumatic diplopia and its treatment through his wartime service with the Royal Air Force.

Although Mr. Lyle's professional reputation would have entitled him to launch a completely new work on squint, he agreed to build on the foundations laid by Worth and Chavasse, who both contributed so richly to our knowledge. Chavasse had pondered for many years about squint, and his cultural background was enlightened, but one could not help noticing a certain austerity of style, especially in the earlier chapters. It is not unfair to say that many readers were discouraged by the initial difficulties of Chavasse's edition. Mr. Lyle has now managed to present the anatomy, physiology, and pathology of the binocular reflexes in a mode intelligible to any trained and reasonably attentive worker. He has kept many of Chavasse's illustrations, and added excellent pictures and charts from his own collection. Guidance concerning investigation, therapeutic methods, and surgical technique, together with pre- and post-operative measures, is clearly given. The importance of tracing the clinical history is rightly stressed, and Mr. Lyle throughout adopts a realistic attitude with regard to prognosis, because he is well aware that every case is different, and that rule-of-thumb methods are never satisfactory.

In the springtime of 1939 Mr. Lyle had already shown special aptitude for the treatment of squint; he had made important contributions to the literature, and was committed to a large share in the teaching of orthoptic methods. Chavasse's admirable book, the 7th edition of Worth's Squint, emerged from the press just as Mr. Lyle was about to cross over to visit clinics in the United States. All the way over the Atlantic Ocean he was plunged in this enthralling work, and the 8th edition proves not only that he has read and re-read Chavasse many times over, but also that he has

constantly been making additions to that wonderful heritage. The new format, with its increased page-size, makes for easier reading, partly because the serial illustrations are no longer cramped. Paper and printing are admirable, and it is obvious that great care has been exercised by the proof readers. Here is a well-produced book, which redounds to the credit of British ophthalmology. Once again Mr. Lyle has written greatly to the advantage of his medical and orthoptic colleagues, having tackled his subject with authoritative orthophoria.

NOTES

INSTITUTE OF OPHTHALMOLOGY

THE new term commences Wednesday, October 4, 1950. The inaugural address will be given by Dr. Russell Brain, President of the Royal College of Physicians; his subject will be "Endocrine Exophthalmos". This will be followed by the annual dinner at Claridges at 7.30 p.m. Tickets, price 25*s*., may be obtained from the Secretary at the Institute.

Past students of the Institute and of the Moorfields, Westminster and Central Eye Hospital are cordially invited to attend.

FOURTH PAN-AMERICAN CONGRESS OF OPHTHALMOLOGY

A NOTICE has been received from the Pan-American Association of Ophthalmology that the Fourth Pan-American Congress of Ophthalmology will be held in Mexico City from January 6 to 12, 1952, under the presidency of Dr. A. Torres Estrada. The co-operation of ophthalmologists from the continent of Europe will be appreciated. Particulars may be obtained from the secretary-general of the congress, Dr. Luis Sanchez Bulnes, 1a. Gomez Farias, 16, Mexico 4, D.F.

DEATHS

WE regret to announce the death of Arthur Stanbury Cobbledick, M.D., M.R.C.S., of Padstow, Cornwall, Margaret Ranken, M.B., B.S., of Sunderland, and Alexander Christie Reid, M.D., D.O., of Nottingham.